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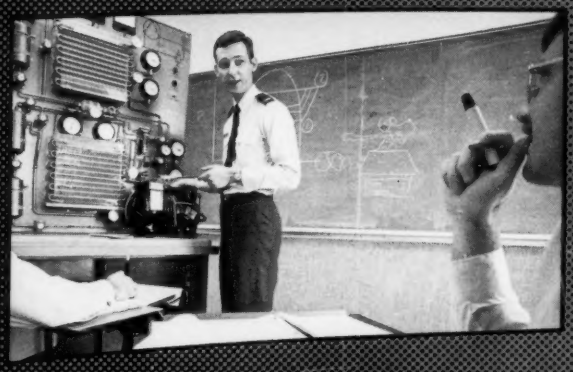
AIR FORCE engineering & services QUARTERLY



That's what education means, to do what you've never done before ...

—George Herbert Palmer—

From the Director

Carry On

In May of 1975, the new Director of Air Force Civil Engineering wrote his first "From the Director" editorial for this publication and titled it "On Breaking with Tradition." The article warned us at that time that we were entering an era of change and that we would have to constantly search for new and better ways and concentrate on improving our management skills through our education and training programs. An environment was promoted where new ideas could be encouraged and developed. Engineering and Services people throughout the Air Force took up the challenge.

In the years since, we have indeed seen many changes in the way we do business—new procedures, new organizations, new ways to better provide the engineering and services support which is so critical to the Air Force mission and Air Force people throught the world. None of this would have been possible without the solid foundation of technical and managerial professionalism fostered by our education and training programs. This issue of the **Quarterly** focuses on many aspects of those programs. As we look ahead, it is most appropriate that we again recognize the importance of equipping our people with all the tools they need—through education and training—to continue to meet the challenges of change.

As I take the reins, I know that we have good programs, in-being and on the drawing boards, and good people throughout the Air Force. Our task is to continue to build on the strong foundation we now have. With your help and dedicated support, we can stand up to all of tomorrow's challenges. And we can carry on the one tradition we don't want to break—searching for and finding better ways to more economically support the Air Force mission and continue to improve the "quality of life" for our people worldwide. I am dedicated to these principles and I earnestly solicit your support, determination and professional efforts in achieving these objectives.

William D. Gilbert

WILLIAM D. GILBERT
Major General, US Air Force
Director of Engineering and Services

Guest Editorialist

An Accent on Education

As the new Commandant of the Air Force Institute of Technology, I am pleased to preface this issue of the **Air Force Engineering & Services Quarterly** with some of my thoughts on education. We in the Institute are very proud of the role we play in national defense. Our challenge is to provide the finest education obtainable and we believe we do that. However, we understand that it is not the education itself that is important but the results of the education—the knowledge applied by our graduates to enhance their abilities to do their jobs.

To those of you in the Engineering and Services career field, this issue of your professional publication is "must" reading, for we have identified the sources of education that are most pertinent to your profession. Some of that education can be obtained from the AFIT but some will require personal effort and individual investment. If you are a manager/supervisor, this issue can help you discover some ways to further develop the knowledge and skills of the people who work for you. I urge you to seek out and invest in education that will help you and your people get the latest skills that will enable you to do the vital Engineering and Services job. Our Air Force depends on it. To survive, we all must learn to do more with less.

GERALD E. COOKE
Major General, US Air Force
Commandant, Air Force
Institute of Technology

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AIR FORCE engineering & services QUARTERLY

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The Air Force has provided a well-integrated educational program for the career field and exciting things are happening which can be profitable to us all. The opportunities are there and here's how you can take advantage of the Air Force Institute of Technology's

Civil Engineering School Program

by Col Oren G. Strom

Because of the daily press of business during which many engineering and services people diligently struggle with a variety of real world challenges, the rationale behind the significance of continuing education is illusive. For some, education is a process high in priority but only after we complete our mission chores. To others, education may infer remedial action, something we pursue only to correct a deficiency. The net effect of these perspectives by supervisors and employees alike is a tendency for a relatively few people to receive all of the education that is available.

Quite often, the individuals who get the education are the progressive thinkers and doers, people who have learned that they can "chop more wood" over the long haul if they occasionally stop to sharpen their axes. They have learned that education is neither remedial nor can it be deferred until it is convenient or until all the hot projects have been completed. They have discovered that education will seldom be executed on schedule without real determination.

Unfortunately, the educational opportunities sometimes go to the "professional student," or to the person most easily spared. The latter needs no further identification; the professional student leaps at every chance to be away from his job, even if it means taking a course totally unrelated to his duties.

Evidence available at the Air Force Institute of Technology's (AFIT's) Civil Engineering School (CES) suggests that we have people in all of these groups within our career field. A 10 year force and attendance study revealed that almost 20 percent of our engineering officers and 64 percent of our officer equivalent civilians have never been to a short course at the School, **Figure 1**. These statistics do not apply to wage board or fire fighter personnel who are eligible for other training. At the other extreme, individuals have been to the CES for eight courses. Through a series of post course interview questions, the School has learned that about three percent of the students believed they should not have come to the particular course in which they were enrolled; in fact, many feel they were picked to attend for such reasons as they were most easily spared, they were the only ones who had not taken a course before or they were the only ones not on a pressing project.

These percentages should startle all Base Civil Engineers (BCEs) and their Branch Chiefs and should at least prompt the BCE to take an inventory of his staff's continuing education. If your people are getting a periodic recharging of their educational batteries in some way, that's just great. If not, perhaps you should be hoping that your reassignment is imminent because your staff is rapidly falling behind the times!

Consider these additional, supportive facts. College and university enrollments in continuing education for working professionals have soared in the past 10 years. Over half the license-granting professions now require continuing education credits for re-licensing at regular intervals. Industry is offering attractive, all fees paid, continuing education to their personnel as a recruitment incentive. Prestigious universities are responding with educational programs and courses designed specifically around company goals and desires. In some cases, the company gives a corporate grant to the department at the university overseeing the program.

Your response to these facts may be: so what? The powerful message is that industry has recognized that its future is tied directly to the quality of its people and that the educational process must be stimulated and nurtured for the mutual benefit of employer and employee. No thinking Air Force manager can afford to ignore or water down that message. The Air Force is

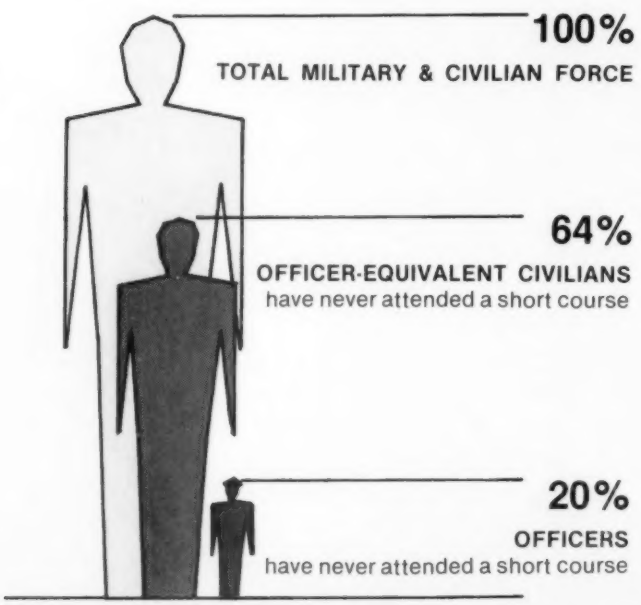
faced with the same dynamic trends that afford ever-decreasing time to meet.

This may perhaps be a long way around to a discussion of the CES, its faculty and staff, and its programs. Our intent, simply stated, is to call to your attention the fact that this business of **education is bigger than you and we combined; we need to work it diligently and to the hilt.** The theme of this issue of the **QUARTERLY** is devoted to education because we in the education business are frankly worried about what may be happening under our very noses. We want to give you a glimpse of some of the things happening behind the scenes that stress how seriously your senior managers and civil engineering educators view this matter of education and what they're doing about it. If you read this issue thoroughly, you should be forced to concede two things:

- **The Air Force has provided a well-integrated educational program for our career field;**
- **Exciting things are happening in education which can be highly profitable to you and your people.**

Let us introduce the CES in terms which you may not have previously heard. Now in its 30th year of operation, the School offers 22 technical and management courses designed specifically for civil engineering officers and officer-equivalent civilians. Some courses are absolutely critical for your engineers. For example, if you have a newly graduated electrical engineer (EE) or mechanical engineer (ME), he or she is likely to need the course ENG 571 or 461, respectively, to become a productive **apprentice.** Studies conducted by the School clearly show that electrical power systems and heating, ventilating and air conditioning design are frequently optional, technical electives at most schools; furthermore, most students do not choose these non-glamourous electives that are so fundamental to Air Force Civil Engineering (AFCE).

Figure 1: Ten Year Force & Attendance Study.



The CES faculty is composed of 25 military instructors who are captains with about nine years of AFCE field experience and two civilian professors. Upon assignment to the School, each officer is sent to the Academic Instructors School at Maxwell AFB, Alabama, to learn the art of professional instruction. Each instructor is assigned on a selective basis for a normal tour of four years.

The School makes a conscious and determined effort to remain current in both the technical and management areas. Every course is thoroughly examined for content each year and changes are made when needed. The faculty uses its contacts with the field and participation in national forums as its source of knowledge in updating courses. In fact, the School is most fortunate in being plugged into practically every activity and agency that crosses the path of civil engineering.

Few of the work force probably know how each major command Deputy Chief of Staff (DCS) for Engineering and Services is tied to the School and its programs. Each year, these senior managers convene at the School to review the two future-year programs and validate the content of courses. It is important to emphasize that the convening group is almost always the first team; seldom do we see a proxy and then only when absolutely urgent mission tasks have arisen. For almost two days, these leaders make significant inquiries into a curriculum they already know well from past reviews. Their objective is to insure that the courses remain relevant to the times and that the highest priority education is being provided to our engineers in the field. They make the final decisions about what courses must be dropped in order to include more relevant ones. Recently, they have made some particularly difficult selections to accommodate critical energy and contingency education. Upon completion, the program committee's recommendations are formally documented in minutes that go to the Director of Engineering and Services for his final approval. This annual review is an intensive and productive action that insures the best possible education for civil engineers.

Another little known but highly significant event is an annual review of the entire educational program of AFIT by a prestigious group of civilian educators. Called the Board of Visitors, these educators evaluate how the AFIT is doing its educational job in comparison with the best standards recognized and practiced in the civilian educational world. Their findings are obviously independent of military influence and serve as an excellent indication of how the AFIT stacks up with

the best in the education business. In their November 1977 report, the Board reported a detailed exploration of the Civil Engineering School course content, faculty characteristics, prospective students and mission. Among its many findings, one in particular is especially significant and is shown in **Figure 2.**

Some question always seems to arise about who makes the determination of who will come to a course at the CES. The answer is of course the MAJCOMs, specifically the DCS/Engineering & Services. The CES allocates numerical quotas to the MAJCOMs, then adjusts them as appropriate to keep all classes filled to the maximum. Funding is available for about 1,800 students each year and every effort is made to accommodate as many students as the dollars will permit; nearly $1 million in TDY funding is used each year.

We are all aware of the pressures to cut costs in every Air Force operation, and education is no exception. DOD is intensely scrutinizing education and training and ways are being explored to save without eliminating essential education. We have already seen evidence of cuts in the scrubdown of specialty training standards for enlisted technical training and the continued reduction in graduate education spaces for officers. The CES has responded to these budget pressures too by seeking ways to reduce costs without reducing education. Since 42 percent of the overall student cost is travel to and from the school, reduction in travel is a most obvious place to begin. If only 50 of our annual 1,800 students took two needed courses on a single trip to the School, a reduction of one percent in total annual costs could be realized. In examining this situation further, the School has found that there are many instances where students could most profitably stay for two or even three sequential courses on a single trip. The best examples of this are the new officers and civilians in the career field that come to the Base Civil Engineering Course, MGT 001. Many are newly graduated engineers who should follow the two week orientation course with some study in electrical, mechanical, civil or architectural engineering applications. Earlier it was pointed out how critical the electrical and mechanical applications courses are to new EEs and MEs.

Figure 2: Extract from Board of Visitors Report.

". . . relative to typical engineering education in the United States, the educational task with which the CES is charged is unique. It is important to note that the School's faculty succeeds admirably in satisfying particularly special educational needs of the Air Force. This goal is accomplished through the design and presentation of a curriculum which, when viewed in its entirety, is also unique in its scope and relative depth in differing areas. Each course responds to actual Air Force requirements and satisfies specific Air Force Civil Engineering needs by building upon a presumed base of undergraduate engineering education."

In order to permit completion of the sequential courses with a single trip, the CES has drastically altered the FY 1979 schedule so that students and supervisors will be able to select from several groups of logical course sequences to fit their specific individual and base needs. For example, the new civil engineer will be able to continue on after the Base Civil Engineering Course next January with any of six different courses; he may choose from ENG 480, Building Systems; MGT 510, Environmental Planning Principles; ENG 460, Mechanical Engineering for Supervisors; MGT 415, Contract Preparation; MGT 425, Contract Management; or ENG 500, Environmental/Sanitary Engineering. He could follow with a third course if applicable to his base and job: ENG 590, Corrosion Control. While it is understood that extended absence from the job is often difficult to arrange and accept, the supervisor and BCE should weigh the increased potential returns against the four to six week absence; it may be a good investment!

One of the most exciting developments now under study at the School is the establishment of a program that would result in the awarding of an AFIT master's degree to selected students. The program under consideration combines continuing education credits earned at the CES with transfer credits obtained at civilian schools. This program envisions no new courses at the CES; it simply uses for degree and credit purposes the continuing education courses that AFCE people currently take to improve their abilities to do their jobs. Most CES courses now offer credit and students have long had the option of electing or declining such credit. No changes are contemplated in the method of selecting students nor would there be any change in the TDY status of students. One possible change might be that students would stay on for a second and perhaps third consecutive course during a single visit to the School. It is planned that five separate sessions at the School over a period of time, not longer than eight years, would be sufficient to complete the course work considered as core hours for the degree and the completion of a required thesis. The student would be simultaneously adding to his credits by taking electives at his home base, either at local universities or in on-base university extension programs. Typical electives might be human resources

management, organizational psychology and managerial career development.

An education plan would be developed for each student who enrolls in the program to insure that his course work is properly planned and sequenced to permit completion of an adequate degree plan. It is envisioned that this would be an accredited degree program tailored specifically to engineering applications found in AFCE. The important part of this program is that students would receive a universal form of recognition (degree) for their continuing efforts to improve themselves to do their jobs better. This concept is similar to many industrial programs which corporations finance for their employees; it allows them to earn degrees while they continue to work essentially full-time on their jobs. This program is still under consideration and development, and you will be alerted to requirements as it progresses.

Many of you may not know that another resident school in AFIT, the School of Systems and Logistics (SOSL), also provides education for civil engineers and, in fact, offers a resident master's degree program in facilities management designed specifically for civil engineers. Located only a couple of blocks from the CES at Wright-Patterson AFB, SOSL has the largest continuing education program within the AFIT. A close liaison exists between SOSL and the CES to insure that the latest developments in engineering and functional management are a part of all educational programs. The faculty of each school does considerable exchange teaching, thus assuring the constant coordination of both Schools' efforts.

By now, it should be evident that our message is simply that **educational opportunities exist somewhere for virtually everyone in AFCE** and we hope you take the fullest advantage of it, regardless of who administers it or where it is located. The times ahead of us are clearly destined to be tougher than ever before. We haven't seen the end of manpower and dollar cuts and the pressures to do more with less. Furthermore, it won't do much good for us to lament that it all must stop somewhere, and we think we've just discovered the stopping point (now!). No matter how good we are we can be better and education is the mechanism. Get your share and stay competitive! C&S

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Civil Engineering School Course Offerings

MANAGEMENT APPLICATIONS COURSES

MGT 001 Base Civil Engineering (2 wks): for the newly assigned officer and civilian equivalent.

MGT 002 Commanders Civil Engineering Orientation (1 wk): for wing and base commanders and deputies.

MGT 004 Environmental Protection Committee Members (1 wk): for base environmental protection committee members in eight functional areas.

MGT 400 Base Civil Engineering Staff Officer (2 wks): for BCEs and Deputy BCEs.

MGT 403 Industrial Engineering Management Applications (2 wks): for chiefs of Industrial Engineering branches.

MGT 406 Family Housing Management Applications (2 wks): for personnel in Family Housing Management.

MGT 415 Contract Preparation (2 wks): for architects and design engineers in EEP.

MGT 420 Engineering and Environmental Planning Management Applications (2 wks): for chiefs of EEP branches.

MGT 425 Contract Management (2 wks): for architects, construction management and design engineers in EEP.

MGT 430 Operations Management Applications (2 wks): for chiefs and deputies of Operations branches.

MGT 510 Environmental Planning Principles (2 wks): for base development planners.

MGT 520 Environmental Planning Applications (2 wks): Advanced course for base development planners.

TECHNICAL APPLICATIONS COURSES

ENG 460 Mechanical Engineering for Supervisors (3 wks): for engineers in EEP and Operations branches.

ENG 461 HVAC (4 wks): for design engineers.

ENG 462 Contemporary Energy Applications (1 wk): for design engineers.

ENG 470 Electrical Engineering for Supervisors (2 wks): for engineers in EEP and Operations branches.

ENG 480 Building Systems Maintenance Engineering (3 wks): for engineers/architects in EEP branch.

ENG 485 Contingency Engineering (2 wks): for all officers in the civil engineering career field.

ENG 490 Architectural Planning (2 wks): for architects, architectural engineers and chiefs of engineering and environmental planning branches.

ENG 500 Environmental/Sanitary Engineering (2 wks): for civil and sanitary engineers.

ENG 550 Pavement Engineering (3 wks): for pavement engineers.

ENG 571 Electrical Engineering (4 wks): for design engineers.

ENG 590 Corrosion Control (2 wks): for corrosion engineers.

Not Under a Shade Tree

The primary objective of the 3770th Technical Training Group at Sheppard AFB, Texas is to instill in each student those attitudes and habits that lead to the development of the ability to solve problems.

by Col Robert F. Darden, Jr

In the years following the great depression, and even immediately after the late great hate (WW II), Americans, for the most part, turned to "shade tree" mechanics whenever their mechanical possessions were in need of repair. These mechanics were largely self-taught. Lacking the wherewithal to purchase maintenance facilities, they set up shop in their own garage, or under a nearby "shade tree." Many of these shade tree mechanics were superlative professionals, but far too many didn't understand the theory behind what they were doing; therefore, it was very difficult for them to stay up with the state-of-the-art without much trial and error, and many costly mistakes.

During the first 22 years of my Air Force career, I was a throttle-jock in the operations career field. I didn't think about technical training much. When I did, in my mind's eye, I pictured that all vocational training took place under the proverbial "shade tree." I also believed that Air Training Command (ATC) decided what courses needed to be taught, and unilaterally developed the course content. Two years ago, my thinking was changed. I became commander of the 3770th Technical Training Group (TTG) with the responsibility for Air Force Civil Engineering technical training, and began to realize how wrong my conception was of Air Force technical training. (By way of explanation, the TTG at Sheppard AFB, Texas, is responsible for 19 of the 22 civil engineering Air Force specialties; 57 courses are taught here covering the 54, 55 and 56 career fields.)

It didn't take me long to understand that the Major Command (MAJCOM) customers, and **not** ATC, decided what was taught at ATC tech training centers. I was exposed to an Air Force regulation known as **AFR 39-1**, "Airman Classification Regulation," which contains the specialty description for every enlisted Air Force job. In fact, it is the "daddy rabbit" for all enlisted Air Force training requirements. The Air Force Military Personnel Center, not ATC, is the office of primary responsibility for **AFR 39-1**. Sure, ATC like every other MAJCOM, gets to coordinate on what goes into **AFR 39-1**, but the chop is as a partner, not as a dictator.

Next, I learned that ATC, using **AFR 39-1** specialty descriptions as a guide, develops the specialty training standards (STSs). The STS outlines the training requirements for each skill level within an Air Force Specialty (AFS). It is also used in the development of technical training and career development courses. After development, the STS is then coordinated with the MAJCOMs and the Air Staff. It is modified to reflect MAJCOM desires, and approved by ATC. Subsequently, this approved STS becomes a contract between ATC and the MAJCOMs. The tech training centers are bound by this contract. They can't change it, and neither can ATC, unless the change is coordinated with the MAJCOMs.

Using the parameters established by the STS, in-

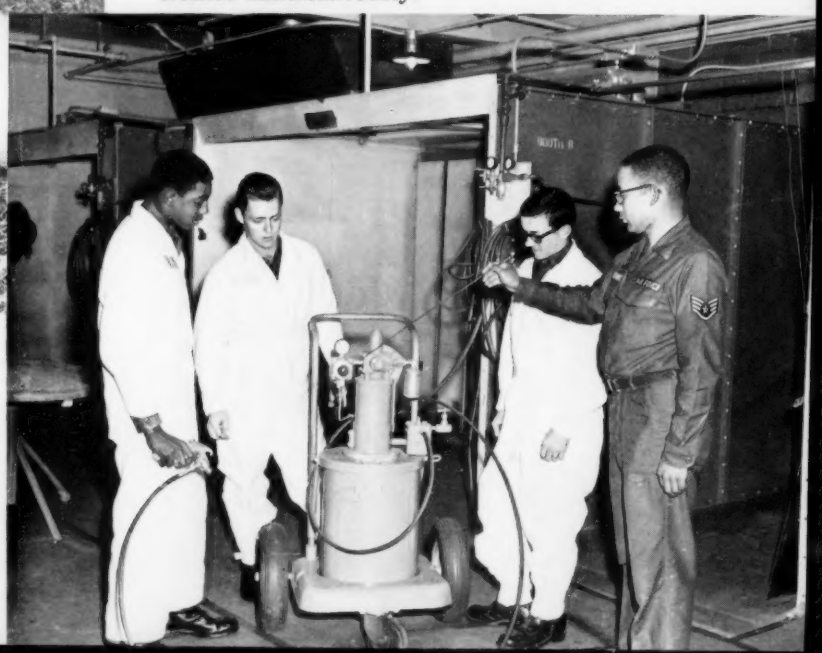
structors have to develop a plan of instruction. Once written, the plan of instruction becomes the instructor's bible; he cannot deviate from its criterion objectives without degrading training. Also, tech writers write Career Development Courses so that the young airmen have a guide for their on-the-job-training out in the field. Finally, advanced, special and supplemental courses are designed as appropriate. However, in all this development activity, no one person or agency can act unilaterally. All are guided by the single thread that is embodied in the **AFR 39-1** specialty description and amplified in the coordinated STS.

The old educational conundrum "Those that can, do—others teach" does not apply to ATC instructors. They are the cream of the crop. In order to be selected for ATC instructor duty, airmen must meet rigid aptitude and intelligence requirements. They must have superior APRs, be outstanding in their field, and complete a rugged six-week Technical Instructor Course. Then he or she must attend the course they are expected to instruct before they can be qualified to teach any block. In addition, a minimum of 36 hours of in-service training is required to be completed by every instructor every year. Also, fixed tours of three years keep most instructors from homesteading at a center and losing touch with the field. Finally, instructors are constantly adding to their educational capabilities. At Sheppard AFB, 60 percent of our enlisted force is engaged in off-duty education. Most instructors have associate degrees, many have bachelor's degrees and several have master's degrees.

Training equipment and facilities at Sheppard AFB are a far cry from "shade tree" caliber. Without a doubt, they are the best in the world. Educators from all over America visit us with an eye toward copying our trainers and laboratories in their own colleges or institutions. A few of the training devices they come to see include:

- The **Mechanical Branch** which has a completely instrumented 80-ton centrifugal air conditioner trainer with a panel that instructors can use to input faults for students to learn correct troubleshooting techniques. They also have the most elaborate heating laboratory in the world. Working models of every heater, old and new, that are likely to be worked on are installed in this unique facility. Students learn to tear them down completely, repair as needed, and reassemble them—tasks that they will be required to do in the field.
- The **Electrical Branch** which has a complete airfield lighting display. This innovative trainer uses "real world" hardware connected to functional control boxes. It is probably the only time these young exterior linemen will ever be able to see all airfield lighting components operational in one room. This branch also houses the Air Force's only Joint Services Interior Intrusion Detection System Trainer which is used to train Army and Air Force Personnel.
- The **Construction Branch** which uses a paint shop that would make any environmentalist proud. It utilizes a waterfall system to separate paint molecules from exhaust air, and provides space for a maximum number of students to be trained simultaneously.

Instructor demonstrates insecticidal dusting to students who are enrolled in the Entomology Specialist Course.



Techniques in the operation of an airless spray unit are explained to students in the Protective Coatings Course.

• The **Power Production Branch** which uses diesel-powered generating equipment up to 650KW to teach maintenance, troubleshooting and repair of electrical generators. These trainers were all designed by civil engineering instructor personnel and built and maintained locally by our Trainer Fabrication Section. Their primary objective is to provide optimum "hands on" training at the most reasonable cost.

Now, let's discuss our product, the graduates from the vocational training courses. Apparently, we must be doing a pretty good job, as complaints from the field about our product have been pretty negligible. In fact, during the past two years, the 3770th TTG has received only four AF Forms 1284, Quality Training Reports. Three of these were from the same man, all complaining that a graduate he had received was only an apprentice, not a journeyman. He was correct. The 3770th TTG doesn't turn out journeymen from its basic courses, only apprentices. Airmen become journeymen through hard work, good supervision and a viable OJT program. ATC tech schools award only 3-level AFSCs. The MAJCOMs award the 5 and 7-level ratings. This is probably the most misunderstood part about technical training. For example, the average graduate from the Heavy Equipment Operators Course, is, in reality, only a driver . . . not an operator. He knows how to start the equipment, do minor maintenance, and has a pretty good idea of what is expected of him. However, he is a far cry from an experienced operator. He needs supervision and he needs "hands on" experience. He is going to make mistakes, but hopefully, lessons will be learned. The commander that grounds a young operator when he makes a mistake will inhibit learning, possibly to the point where the young man will never reach the journeyman level.

The philosophy of education at the 3770th TTG is quite similar to the philosophy of that great educator, John Dewey. We believe that the primary objective of education must be to instill in students those attitudes and habits that lead to the development of the ability to solve problems. This requires that emphasis must be placed not on rote learning of factual information, or inherited ideas, but rather on effective research methods by which such information or ideas are discovered and validated. This objective can be more readily achieved when two common sense precepts are observed:

• One, the formal classroom instruction must seek to "learn by doing" and to build on the student's experiences outside the classroom.

• Two, the classroom atmosphere must be arranged to make learning a pleasurable experience.

Certainly, we show our students the Air Force way. We teach them how to go by the book: how to interpret regulations, how to read tech orders and how to follow checklists. However, we also

Students in a pavements maintenance course learn how to remove and replace railroad ties and rails.

spend adequate time on the theory behind the course they are taking. We encourage original and creative thought, hoping that, as they mature out in the field, they will constantly seek better ways to do things. The two tired, old phrases "because we've always done it that way" and "because I said so" are not found in any plan of instruction, or used by any instructor on Sheppard AFB.

What can you do for us? You can supply us with feedback. We are not naive enough to believe that just because we don't get many AF Forms 1284 that we do perfect work. Without feedback as to where our weaknesses are, it is almost impossible to improve our product. The AF Forms 1284 that we need are those that offer constructive criticism, and are specific enough so that we can take corrective action. Just "bad mouthing" ATC won't change a thing, but I guarantee that an AF Form 1284, pin-pointing a legitimate problem, will. I get personally involved, and will respond even if, after my investigation, I don't agree with you. We also need your help in objectively completing questionnaires for Occupational Survey Reports and Training Evaluation Reports. Make sure that your people take their time and complete these questionnaires in such a constructive way as to insure the integrity of their results. We solicit your support in providing you, our customers, with the best qualified civil engineering technicians possible.

C&S

COLONEL DARDEN *is Commander, 3770th Technical Training Group, Technical Training Deputate, Sheppard Air Force Base, Texas. He earned a bachelor's degree from the University of Nebraska and a master's degree in education from The American University.*

3700th Technical Training Group Course Offerings

This training group is engaged in training personnel in basic, lateral, supplemental, advanced, and special courses in support of four Air Force Career Fields; Airman Aircraft Systems Maintenance (42); Airman Civil Engineering Mechanical/Electrical (54); Airman Civil Engineering Structural/Pavements (55); Airman Civil Engineering Sanitation (56).

AFS 427X1, CORROSION CONTROL SPECIALIST/SUPERVISOR

J3ABR42731—Corrosion Control Specialist—PDS Code AGZ (6 weeks)
J3AZR42751—Aircraft Corrosion Control—PDS Code E9N (1 week)

AFS 541X0, MISSILE FACILITIES SPECIALIST/TECHNICIAN

3ABR54130E-000—Missile Facilities Specialist, LGM-25 (Operations) PDS Code VG7 (14 weeks 2 days)
3ABR54130F-002—Missile Facilities Specialist, LGM-25 (Maintenance) PDS Code VHA (17 weeks)

AFS 542X0, ELECTRICIAN/ELECTRICAL TECHNICIAN

3ABR54230-1—Electrician—PDS Code AJZ (9 weeks)
2ASR54250-2—JSIIDS Installation and Maintenance—PDS Code T7N (3 weeks)
3AZR54250-000—Intrusion Alarm Systems—PDS Code B8N (2 weeks)
3AZR54250-002—Cathodic Protection Maintenance—PDS Code BKE (2 weeks)
4AST54250-004—Fire Alarm Systems—PDS Code QJM (2 weeks)

AFS 542X1, ELECTRIC POWER LINE SPECIALIST/TECHNICIAN

3ABR54231—Electric Power Line Specialist—PDS Code GBS (12 weeks)
3AZR54251-000—Airfield Approach Lighting, Condenser Discharge PDS Code C89 (2 weeks)
3AZR54251-001—Electric Distribution System Maintenance PDS Code EJ8 (6 weeks)

AFS 542X2, ELECTRICAL POWER PRODUCTION SPECIALIST/TECHNICIAN

J3ABR54232-001—Electrical Power Production Specialist—PDS Code unassigned (9 weeks)
J3AAR54272-001—Electrical Power Production Technician—PDS Code unassigned (9 weeks 2 days)
J2ASR54252-001—Arresting Barriers—PDS Code LND (1 week 3 days)
J2ASR54272-XXX—Troubleshooting Electrical Power Generating Equipment PDS Code unassigned (2 weeks)
J3AZR54070-XXX—Civil Engineering Solid State Applications—PDS Code unassigned (4 weeks)
J4AST54250-000—Aircraft Arresting Barriers, BAK-9/MA-1A—PDS Code G5C (1 week)
J4AST54252-001—Aircraft Arresting Barriers, BAK-12/MA-1A—PDS Code G58 (1 week 2 days)
J4AST54252-002—Aircraft Arresting Barrier, BAK-12—PDS Code DX0 (1 week 1 day)
J4AST54252-005—AUTODIN Uninterruptible Power System—PDS Code RBF (9 weeks)

AFS 545X0, REFRIGERATION AND AIR CONDITIONING SPECIALIST/TECHNICIAN

3ABR54530—Refrigeration and Air Conditioning Specialist—PDS Code ATA (17 weeks)
3AZR54550—Refrigeration and Air Conditioning Controls (M-H)—PDS Code CVQ (3 weeks)
J3AZR54550-001—Refrigeration and Air Conditioning Controls (Johnson) PDS Code CVL (2 weeks)
J3AZR54550-002—Refrigeration and Air Conditioning Equipment—PDS Code CVN (5 weeks)

AFS 547X0, HEATING SYSTEMS SPECIALIST/TECHNICIAN

3ABR54730—Heating Systems Specialist—PDS Code ALO (10 weeks)
3AZR54750—Central Heating Plant Specialist—PDS Code NRS (5 weeks)
J2ASR54750—Boiler Water Treatment and Corrosion Control—PDS Code X9B (1 week 1 day)

AFS 55XXX, CONTRACT CONSTRUCTION INSPECTOR

J3AZR55000—Contract Construction Inspector—PDS Code BK5 (5 weeks 1 day)
J4AST55000—Construction Inspector—PDS Code UXI (1 week)

AFS 551X0, PAVEMENTS MAINTENANCE SPECIALIST/TECHNICIAN

J3ABR55130—Pavements Maintenance Specialist—PDS Code AQZ (7 weeks)
J3AZR55150—Pavements Maintenance Specialist—PDS Code GAL (3 weeks)

AFS 551X1, CONSTRUCTION EQUIPMENT OPERATOR/TECHNICIAN

5ABA55131—Construction Equipment Operator—PDS Code AGV (Conducted at Fort Leonard Wood, Missouri) (10 weeks)
J4AST55151-011—Snow Removal Equipment Operator—PDS Code FFY (3 weeks)
J4AST55151-012—Snow Removal Equipment—PDS Code UN8 (1 week)

AFS 552X0, CARPENTRY SPECIALIST

J3ABR55230—Carpentry Specialist—PDS Code NDZ (6 weeks 2 days)

AFS 552X1, MASONRY SPECIALIST

J3ABR55231—Masonry Specialist—PDS Code NDO (6 weeks)

AFS 552X4, PROTECTIVE COATING SPECIALIST/TECHNICIAN

J3ABR55234—Protective Coating Specialist—PDS Code ASP (6 weeks)

AFS 552X5, PLUMBING SPECIALIST/TECHNICIAN

3ABR55235-000—Plumbing Specialist—PDS Code ARL (9 weeks)

AFS 553X0, SITE DEVELOPMENT SPECIALIST/TECHNICIAN

J3ABR55330—Site Development Specialist—PDS Code ATO (14 weeks 3 days)

AFS 554X0, REAL ESTATE-COST MANAGEMENT ANALYSIS SPECIALIST/TECHNICIAN

3ABR55430—Real Estate-Cost Management Analysis Specialist—PDS Code HMN (6 weeks)
J3AZR55450-000—Industrial Engineering Techniques—PDS Code TFM (5 weeks)
J3AZR55470-000—Real Estate and Cost Management—BEAMS—PDS Code FQA (2 weeks)

AFS 555X0, PROGRAMS AND WORK CONTROL SPECIALIST/TECHNICIAN

J3ALR55530-003—Programs and Work Control Specialist—PDS Code G6J (8 weeks)
J3AZR55000-001—Base Civil Engineering Supervisor—PDS Code SU2 (3 weeks)
J3AZR55570-000—Programs and Work Control Technician—BEAMS —PDS Code FP9 (2 weeks)
4AST55570-1—BCE Planning Technician—PDS Code N5H (1 week)

AFS 566X0, ENTOMOLOGY SPECIALIST/TECHNICIAN

J3ABR56630—Entomology Specialist—PDS Code AJ4 (6 weeks)
J3AZR56650—Disease Vector and Pest Control Technology—PDS Code N18 (4 weeks 2 days)
J2ASR56650-3—Application of Herbicides—PDS Code HE9 (3 weeks)
4AST56650-1—Pest Control—PDS Code KK9 (2 weeks)

(Continued on page 28)

...a synopsis of academic activity to assist personnel

CONTINGENCY COURSE TO BE INITIATED--The Program Review Committee, which recently met at the Civil Engineering School (CES) at Wright-Patterson AFB, Ohio, requested the addition of a course in Contingency Engineering for FY 1979. The Committee, composed of major command DCSs for Engineering and Services, reviewed current and proposed continuing education programs through FY 1980. The Contingency Engineering course will develop the capabilities for the management of civil engineering activities in expeditionary and contingency situations. The two week course will cover the tasks and responsibilities of Air Force Civil Engineering in a theater of operations along with the analyses of the resources needed.

CONTEMPORARY ENERGY APPLICATIONS COURSE (CEA)--A new resident solar energy course at the CES, developed through a series of seminars and workshops, will be available in FY 1979. The Course will enhance and update the professional abilities of architects and engineers to prepare programming documents for alternate energy systems. Fundamentals needed to exploit the findings of the energy audit program, to improve energy conservation and to evaluate coal conversions will be analyzed, with emphasis on programming techniques.

TELETEACH PROGRAMS ON VIDEO TAPE--The CES is building a catalog of teleteach programs on video tape in both the technical and managerial areas. Technical topics include Electrical Grounding and Safety, Built-up Roofing Management, Built-up Roofing Systems (2 parts), and Environmental Noise. Management topics are Interagency/Intergovernmental Coordination for Environmental Planning, Environmental Noise, Bird Air Strike Hazards, and Environmental Technical Information System. Base Civil Engineering organizations who are interested can contact the CES for further information.

FINANCIAL MANAGEMENT--A series of base level funds management workshops will begin in August at the CES. The series will specify needs and provide curriculum development for a proposed resident short course for BCE funds managers, probably to be first offered as a resident course in FY 1980. If you have any ideas about what education should be included, let your MAJCOM staff know as soon as possible.

* * * Your attention is drawn to remarks made elsewhere in this issue about the degree granting program currently under study within the CES at AFIT.

Fire prevention technology occupies a prominent role in the Air Force's overall fire protection policy today. Professionalism has arrived; the philosophy of fire fighting has changed from fire extinguishment to fire prevention. Here is the report on the Air Training Command's

Classrooms are "burning infernos" as knowledge and skills are applied in the structural portion of the basic fire protection course.

Fire Protection Training School Program

by Maj Robert L. Gott

The US Air Force Fire Protection Training School at Chanute AFB, Illinois, will train over 4,000 personnel from the Department of Defense in fire protection courses this year that range from basic apprentice fire fighting to advanced fire protection engineering and technology. The School has come a long way since its establishment in the winter of 1943 within the Army Air Corps, and today is the free world's most complete fire protection institute.

Even though massive strides have occurred within the last 35 years, today's Air Training Command personnel continually strive to increase the capabilities of graduating students to perform fire fighting and rescue operations in any situation. Daily, the fire school faculty and a composite staff of 120 military-civilian instructors and superintendents work to develop better training procedures that will greatly increase the graduates' ability to perform fire protection duties in adverse situations.

Through training in the crash portion of the basic fire protection course, towering flames and billowing smoke are attacked with confidence.

Air Force Fire Protection represents a unique type of insurance policy, in that no reimbursable monies are available to offset losses after a disastrous fire. The fire protection policy must go into effect for the Air Force in many different ways. It begins with training at the Air Force Fire School where over 1,500 airmen are entered annually in the basic fire protection course. In addition, approximately 200 US Army personnel are trained each year in the course through an interservice agreement established in 1974. For the Air Force and Army, the basic fire protection course is offered as Category A training which requires that one be a graduate prior to initial assignment to the field. When graduates arrive at their duty assignments, they are qualified fire fighters having participated in the suppression of massive JP-4 crash and structural fires. In a sense, they have already become professionals with the new training, experience and confidence gained from the course which enables them to

Fire situation simulator in the crash mode will provide total visual and hearing effects. Control of wind direction will simulate command control decisions here.

perform their life-saving mission when called upon. Equally important, they know it.

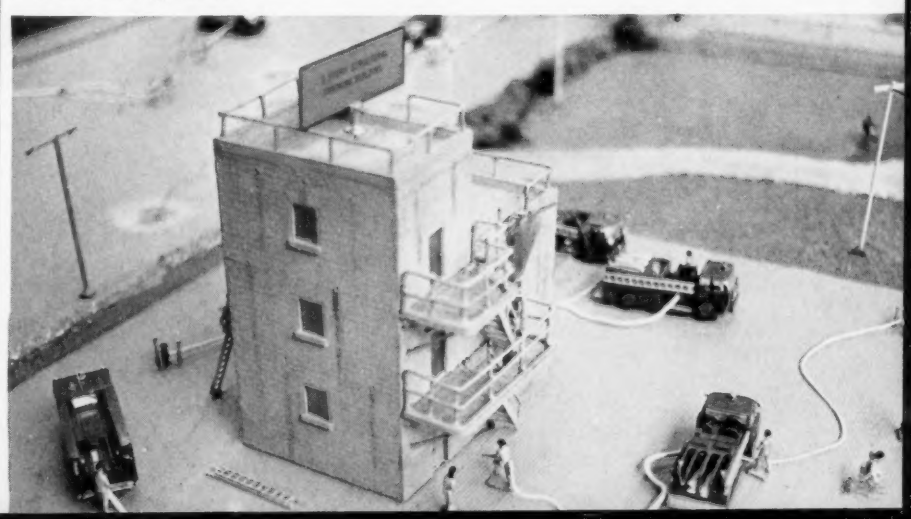
Initial abilities are gained through precise objectives of the basic course which gives specialized training in theory and fundamentals of fire protection. Students begin with the chemistry of fire, knowledge which is necessary in order to know how to safely rescue people from fires and to give emergency first aid treatment. Then the ultimate test of the student's stamina comes as structural, live fire training is provided. Rigorous drills are conducted in a smokehouse with burning combustible materials. Literally, the smokehouse becomes the classroom. Special protective clothing and breathing apparatus are used and trainees are required to complete a simulated rescue operation in conjunction with the suppression effort. Although the environment is controlled, the fire situation is real and unpredictable as "danger lurks in the air."

One wonders about the thoughts crossing the trainees' minds as they are exposed to the inferno for the first time, but, performing as a crew, trainees are rotated and their expectations are soon replaced by confidence, motivation and a sense of instant success. After their "baptism of fire" in structural training, the novices are ready for large petroleum fires representing aircraft crash fires. This type of fire is required in order to effectively simulate the towering inferno that often occurs during an aircraft crash. Here the student becomes a veteran fire fighter in the true sense as split-second timing is coupled with the trainee's confidence to walk into a 2,000 degree fire and affect a safe rescue of a simulated aircraft crew and subdue the flames.

During this last portion of the course, the impulse heightens as even the slightest fears are overcome with confidence. Trainees have now learned how to operate sophisticated structural and crash rescue vehicles and to protect themselves with their bunker clothing and breathing equipment. They have been rewarded with the experience of looking through high pressure agent streams to see out-of-control fires diminish. The basic fire fighter course is completed as the diplomas and fire protection badges are awarded. A basic foundation has been laid and new fire fighters have been born.

During the first few weeks at their new duty assignment, the graduate fire fighter will be oriented on the fire protection mission and responsibilities that are peculiar to the installation. All of the new fire fighters will have now joined the ranks with experienced professionals and this merger will form pacesetting teams in the application of modern fire protection technology. Spontaneously, a different training program will begin and each new fire fighter will automatically be enrolled. The program is structured by the Air Force and obtains its goals through on-the-job training (OJT). The OJT program provides structured progression and rewards successful accomplishments with skill level advancements and promotion eligibility. Over the months to come, the young fire fighters will apply the skills and knowledge received through technical training. The OJT program will expand and build on the basic foundation received. This training will be intersected with real situations and inexperience will become history as fire fighters join skills in their lifesaving mission. **Whenever a**

A fire situation simulator will provide training for key officials in command control and fire strategy tactics.



life is saved, a fire fighter is not injured, or property at risk is minimized in damage, then training has reaped its benefits.

The Chanute Fire School will remain in the wings for much of the airman's career, supplementing the field OJT program with advanced and special training courses. Around 4,000 fire protection personnel from the Air Force, Army, Navy, Marine Corps, Coast Guard, Reserve and Guard units are trained annually at the School in advanced and special courses. One-third of the students trained are DOD civilian fire fighters employed at military installations. In the advanced and special courses, ranging from fire prevention and engineering to fire and arson investigation, students are provided intensive instruction in fire protection technology. This unique area of the School offers six supplemental courses, three special technical training courses and one advanced course. The courses include crash vehicle operator, training in conventional/nuclear weapons fire protection and rescue operations. It is significant that 29 lives have been saved since implementation of the rescue course in 1970. It is more than coincidental that these saves were made by qualified rescuemen who were graduates of the course. The rescue course, reportedly

Chanute Technical Training Center Course Offerings

Fire Protection Specialist (Basic Course)
(C3ABR57130-001) (6 wks, 2 days): Category A required for all new military airmen being assigned to the fire protection career field AFSC 571X0. Also available to new Army fire fighters, new civilian hires within DOD and foreign students.

Fire Protection Specialist (Munitions)
(C3AZR57150-001) (1 wk, 2 days): AFSC 57150/70 or civilian equivalent in fire protection.

A/S32P-4/P-2 Fire Truck Operation
(C3AZR57150-00) (2 wks): AFSC 57150/70 or civilian equivalent in fire protection. Valid operator's permit authorizing operation of crash fire fighting vehicles required.

Fire Fighter Rescueman
(C3AZR57150-003) (2 wks, 2 days): AFSC 57150/70 or civilian equivalent with a minimum of two years continuous service in fire protection. Must have valid operator's permit to operate rescue vehicles. Must have face shaven in such a manner not to interfere with the wearing of breathing apparatus.

Fire Prevention Inspector
(C3AZR57170-003) (4 wks): AFSC 57190/70/50 or civilian equivalent assigned or scheduled to be assigned the fire prevention functional area. NOTE: This is a new course consolidating course 3AZR57170, Fire Prevention Technician, and Course 3AZR57150-9, Installed Fire Protection Systems now discontinued.

Fire Protection Supervisor
(C3AAR57170-001) (4 wks): AFSC 57150, SSgt or civilian equivalent or higher with a minimum of three years continuous service in the fire fighting organization and at least six months supervisory experience in one or more functions of a fire fighting activity. NOTE: Action is pending on this course. Upon completion of a fire situation simulator now under construction, this course will be discontinued. The training will then be screened for consolidation with the new Advanced Fire Protection Technology Course and expanded along with Command Control and Fire Strategy.

Fire Investigation
(C3AZR57170-008) (1 wk, 3 days): AFSC 57170/90 or civilian equivalent with a minimum of three years experience in fire protection, or MAJCOM position in the fire protection or fire prevention functional areas.

Crash Fire Fighter
(C2ASR57150-000) (1 wk, 4 days): AFSC 571X0 military and civilians requiring basic training in crash fire fighting.

Fire Protection Specialist (AFRES)
(C2ASR57150-004) (2 wks): Designed for Air Force Guard and Reserve Units requiring structural and aircraft crash fire fighting training as a unit.

Fire Suppression Operations
(C2ASR57150-010) (2 wks): Designed for Army National Guard and Reserve units requiring structural and aircraft crash fire fighting training as a unit.

Fire Protection Orientation
(C2ASR57150-012) (5 days): Designed for the Base Civil Engineer Officer (Fire Marshals) or officer personnel projected to assume the position.

Advanced Fire Protection Technology, Fire Chiefs, Deputy Fire Chiefs and Assistant Fire Chiefs
Presently in the planning stages. An operational fire situation simulator is now under construction. Course length is projected to be four weeks and a course number will soon be established.

A/S32P-2 Fire Fighting Vehicle Operator
(C4AST57150-000) (8 days): Mobile Traveling Team (Discouraged for CONUS use).

A/S32P-4 Fire Truck Operation
(C4AST57150-004) (8 days): Mobile Traveling Team. (Discouraged for Air Force CONUS use).

Inquiries relative to allocations for courses should be addressed to Headquarters Air Training Command, ATC/TTMS, Randolph AFB, Texas 78148. Consult **AFM 50-5**, Volume II for continued currency of course announcements.

the first to be offered by any US defense organization, now produces graduates at a rate exceeded only by the basic fire protection specialist course. Through this formal technical training, supplementing the OJT program, fire fighters will enhance their expertise, gradually earning gold badges and becoming new department managers.

Having reached the upper levels of proficiency, fire fighters will begin a systematic attack on the problems facing an ever-changing career field where fire protection technology is becoming more complex. Thev will become assistant chiefs, deputies and finally, chiefs. There is a realization of the fact that fire protection and the security of Air Force resources are obtained through engineering, fire prevention, inspection and educational programs for the base populace. Interestingly, if all these conditions could ever be totally effective with the human element, actual fire suppression would never be needed. For example, prior to the development of the fire prevention inspectors course, Air Force fire loss statistics over a 10 year period averaged approximately $11 million. Statistics showed that 99 percent of all Air Force fire losses were caused by oversight or ignorance. The figures were based on depreciated real property values and did not represent the actual replacement value, estimated to be as much as 10 times higher.

Following the training of key officers, beginning in late 1967 through June 1976, an intriguing development occurred; the annual Air Force fire losses dropped by some 80 percent. This can be attributed to fire prevention technology which occupies a prominent role in the Air Force's overall fire protection policy today. Professionalism has arrived; the philosophy of fire fighting has gradually changed from fire extinguishment to **fire prevention.**

MAJOR GOTT *is Chief, Fire Protection Training Branch, Chanute Technical Training Center, Chanute AFB, Illinois. He holds a bachelor's degree in petroleum engineering from the Montana Institute of Science and Technology and is a member of the Society of American Military Engineers.*

Another significant development has been achieved through the fire and arson investigations course. Prior to adoption of this course in 1974, many Fire Reports indicated the cause of fires as "unknown." Today, investigative techniques are quickly applied, fire causes are determined and fire prevention measures are applied to round out the total fire prevention role.

Still another milestone will be accomplished this year as work progresses toward development of a new course for senior fire officials. Considered to be the vital link to total fire protection training, the new course will concentrate on command control and fire strategy. It will stimulate fire chiefs, deputies and assistant fire chiefs to carefully review and, where appropriate, update fire tactics and strategy, especially in regard to wartime operations. The training will be accomplished on a fire situation simulator coupled with intensive academic instruction. The simulator will facilitate scale vehicle responses with student observance of simulated fire, smoke and sound effects. Through electrically controlled panels, instructors can simulate a multitude of structural and aircraft fires. The simulator, designed in its initial stages by personnel from the fire school, will be the first of its kind in the world when completed.

A unique trainer is used for actual forcible entry training.

Instructors assigned to the School represent an outstanding cross section of the Air Force fire protection career field. The supervisory and instructor staff is composed of field tested fire protection specialists and superintendents. It has often been said that through the volunteer and selective system of recruiting for instructor duty at the School "the Fire School team has taken a gigantic step in raising the effectiveness of fire protection technology throughout the Air Force and, in the process, has substantially uplifted the image and morale of those within the career field."

The impact of the contributions that the School has made and is still making has been significant on worldwide fire protection. The School was instrumental in the writing of the International Fire Service Training Association Manual 206 on Aircraft Fire Protection and Rescue procedures which is used by 44 states and 19 foreign countries, and has formed an association with the State of Illinois Fire Protection Personnel Standards and Education Commission's Committee on Airport Fire Protection. Also, through a viable plan established with the Chanute AFB Fire Department, the School's resources of manpower and equipment have been used on several major fires occurring in the communities surrounding the base.

Fire fighters work hard to maintain fire as a friend and not an enemy. Through continued training at the formal schools at Chanute AFB, the field OJT program and proficiency training, fire fighters stand to serve, fulfilling whatever mission in fire protection they are assigned. C&S

Professional training is a key to professional success. For the Services career field, professional development is provided by the

Services Training School Program

by Capt Ronald A. Roye

The Lowry Technical Training Center at Lowry AFB, Colorado, is committed to providing technical training through resident and non-resident courses, and traveling teams of instructors. Its training mission is accomplished through a school organization similar to a modern university. Each year approximately 20,000 students graduate from the Center's five technical training groups: Logistics, Munitions, Audio-visual, Avionics and Armed Forces Air Intelligence Training. Military students include personnel from all branches of the service, the Air Force Reserve, the Air National Guard as well as civilian employees of the Federal government. In addition, there are advanced courses for senior officers and noncommissioned officer personnel in the curriculum.

The Services Training Branch is part of the Logistics Technical Training Group. The Group is divided into three training branches: Supply, Procurement and Services, with each operating on the "single manager" concept. This means that branches manage their own curriculum (training material), resources (funds, manning, facility utilizations, supplies and equipment), and measurement (testing, analysis and student administration functions) for their resident courses.

Non-resident Career Development Courses (CDCs) are developed by the branches but administered through the Extension Course Institute. Under this concept, CDC writers manage both resident and non-resident training by career ladder. This results in better training through single point management of all Services career field training.

During 1978, the Center will graduate almost 1,100 students from its services courses. Of that amount, the Basic Cook Course will train over 500. Unlike other courses, Cook Training is divided into two distinct phases. The first four weeks of the eight week course is conducted in the classroom at which time the student is taught food service theory. During the remaining four weeks, students actually prepare and serve meals in the Base's dining halls.

Throughout this time, instructors and staff emphasize the importance of motivation and pride. The word "cook" has long had a career image that is non-glamorous. Our intent is to convince the student that this career field is highly technical and holds a significant place in civilian industry. So far, evaluations from the field show an exceptional degree of satisfaction with these graduates.

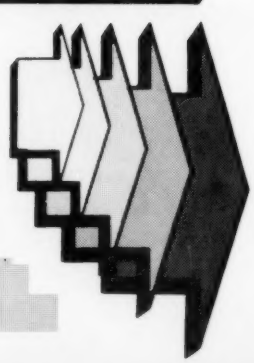
The "other half" of our training is designed to teach supervision and management of services activities. These courses cover Services Operations Officer, Services Supervisor, Food Service Officer and Food Service Supervisor training. Also, the Center is developing three additional courses which will address Billeting Management, Commissary Management and Staff Services Officer training. Classes are tentatively scheduled to begin within the first half of FY 1979.

Instructors in the Services Training Branch are specially selected, each representing the best within the Services career field. Many instructors have earned the coveted Master Instructor rating, and all of them actively pursue programs to improve their education and training credentials.

Professional training is a key to professional success. If you are a graduate of a resident Services course, help spread the word about Services training. If you haven't been here, the Center would like to help in your professional development. C&S

CAPTAIN ROYE *is Chief, Services Training Branch, Logistics Training Group, Lowry Technical Training Center, Lowry AFB, Colorado. He earned a bachelor's degree from Central Washington State University and a master's degree from Wayne State University. He is currently enrolled in a Doctorate of Education program at the University of Denver.*

Services Career Field Course Offerings



30BR6221-001, Services Operations Officer

(2 wks, 3 days): Lieutenant through Captain or civilians of equivalent grade assigned to or being assigned to Services Operations Officer position. Provides training in security, Services career field, consumer advocacy, intra-base relationships, Army and Air Force Exchange Service (AAFES), Air Force Commissary Service (AFCOMS), mortuary affairs, linen exchange, food service, billeting and furnishings management.

20SR6221-000, Mortuary Officer

(3 days): Lieutenant through Lieutenant Colonel, and civilians of equivalent grade assigned or being assigned to mortuary affairs duty. Provides training in duties and responsibilities of Mortuary Officer, mortuary benefits and eligibility, care and disposition of remains, contract mortuary services, escort and transportation of remains, Military Honors Program, Summary Court Officer duties and case problems.

3AZR61170-003, Services Supervisor

(9 days): AFSC 61150 or higher and civilians of equivalent qualifications assigned to the Services career field. Provides training in property responsibility and supply discipline, Services career field, Air Force publications, personnel relations and management, consumer advocacy and management responsibilities, billeting furnishings management, Class VI and mortuary affairs.

30BR6241-001, Food Service Officer

(10 days): For all food service officers and civilians (GS-7 or above) assigned to equivalent positions. Provides training in security, base services organizations, analysis of food service operation, principles of food service operations, management fundamentals, relations with base activities, consumer advocacy, resource management principles of contract administration, human behavior and management techniques, facility improvement, specific responsibilities of the food service officer and key management indicators.

3AAR62270-000, Food Service Supervisor

(2 wks, 4 days): Sergeant or higher in second or subsequent enlistment at the 5-skill level and assigned as dining hall superintendent or food service superintendent or food service NCOIC, and civilians with comparable qualifications and position. Provides training in career field progression, management techniques, publications, USAF worldwide menu, Consumer Level Quality Audit Program (COLEQUAP), subsistence records and accountable forms, cooks worksheet, food service operations report, nutrition, safety, equipment and supplies, flight feeding, contingency operations, contract monitoring, inspecting food service activities, key management indicators, and evaluating performance of personnel and dining hall facilities. NOTE: Baker Training to be included in FY 1979.

3ABR62230-000, Cook

(8 wks): Basic course. No grade or skill level prerequisites. Provides training in career progression, communications security, supervision and training, sanitation and personal hygiene, preparation of food for cooking, cooking of food for serving, serving line techniques, types and preparations of flight and missile complex meals, supplies and equipment and food service administrative functions. NOTE: Baker Training to be included in FY 1979.

3AQR62231-000, Diet Therapy

(6 wks): Same as 3ABR62230-000. Students taught Food Service fundamentals, then attend Diet Therapy Specialist Training at Sheppard AFB, Texas.

The following courses are approved and under development:

30AR6211-000 Services Staff Officer

(7 days): Company grade Services officers with more than two years experience in the Services career field; top-three noncommisssioned officers from the Services career field; field grade officers assigned to or being assigned to the Services career field. Provides training in the functional responsibilities of Services, role of consumer advocacy, management techniques, intra-base relations, facilities improvement, resources management, contracting, personnel management, pulse points and readiness.

30ZR6221-000, Billeting Management

(15 days): Officer, noncommissioned officer and civilian personnel in AFSC 622X, 61290 and 61170 assigned duties in billeting activities. Provides training in management and control of bachelor and transient quarters, programming and maintenance of quarters, nonappropriated fund management and accounting, labor management, supervisory skills, customer service, housekeeping management and general management techniques.

30ZR6234-000, Commissary Operations

(15 days): Officer, noncommissioned officer and civilian personnel in AFSC 623X, 61290 and 61170 assigned duties in commissaries. Provides training in management and control of commissaries, organization, equipment and personnel management, requisitioning, receiving, warehousing, pricing procedures, issues, sales, display and merchandising, inventory and accounting procedures and commissary operating program.

These Career Development Courses are offered through the Extension Course Institute:

CDC 61130, Apprentice Services Specialist:

Introduction to the Services career field; fundamentals of merchandising; commissary and commissary store and base linen control.

CDC 61150, Services Specialist:

Role of specialist; linen exchange systems; commissary organization and functions; determining requirements and requisitioning subsistence; receiving and warehousing operations; and issues and sales.

CDC 61170, Services Supervisor:

Role of supervisor; Air Force publications; financial management; managerial functions; inventory and capital control procedures and mortuary affairs.

CDC 61250, Meatcutter:

A career in meat processing, operation and maintenance of meatcutting equipment; receipt and storage of meat and poultry; cutting and preparing beef; cutting and preparing veal, lamb and pork; wrapping, sealing, weighing and pricing retail meat items; and supervisory and technical meatcutting functions.

CDCs 62130 and 62150, Apprentice Baker and Baker:

Airman career field, safety, sanitation and personal hygiene, baking fundamentals and production of pastry and Air Force supply discipline.

CDC 62230, Apprentice Cook:

Role of the apprentice cook, food preparation, cooking and serving.

CDC 62250, Food Service Specialist:

Role of the Specialist-Food Service Career Field; sanitation; and operation and maintenance of food service equipment. Food preparation and service-principles of cookery; cooking methods; serving food; and meatcutting and baking fundamentals. Flight feeding and food service accounting-flight feeding systems and food service accounting.

CDC 62270, Food Service Supervisor:

Management, supervision and administration of food service; sanitation, inspection and storage; career of food service equipment; and flight and missile feeding.

In summary, the Services Training Branch covers all aspects of the Services career field. The training provided contributes directly to both improving our readiness role and increasing the quality of life within our Air Force communities. Inquiries about resident or non-resident courses should be addressed to: 3440 TCHTG/TTMXF, Lowry AFB, Colorado 80230. Key Telephone numbers are:

Branch Chief	AUTOVON 926-3211
Curricula Development	AUTOVON 926-3211
Course Supervisors (Services)	AUTOVON 926-2845,4441
Course Supervisors (Food)	AUTOVON 926-3178
Career Development Courses	AUTOVON 926-3080,3946

An Era

One of the most remarkable perio field—noted for its dynamic chan cludes with the retirement of the and Services, Maj Gen

by George K.

The passing of an era—most noted for its progressive change—has been indelibly inscribed in the annals of Air Force Engineering and Services with the retirement of Maj Gen Robert C. Thompson on 1 July 1978. During his tenure as the senior engineer in the Air Force for almost three and one-half years, General Thompson not only laid the foundation for dynamic improvements in mission support, management, operational procedures and economical performance, but also instituted some of the most unique programs to upgrade the quality of life and living on Air Force installations that the service has ever known. Certainly, these improvements will endure for years to come and historians will record his contributions as some of the most visible and tangible in the history of the Air Force.

When General Thompson assumed the leadership of the Directorate of Civil Engineering, DCS/Programs and Resources, on 1 April 1975, he candidly announced a philosophy of operation and management that bordered on the controversial. "As I look to the future," he said, "the emphasis is on programs for people—also, all indicators point toward the continuing need for us to do more with less. We are entering an era of change—a time for finding new ways of doing things, innovation, breaking with tradition and new ideas."

Perhaps the first indication of what the General meant with these words occurred less than five months into his directorship. The Directorate was renamed the Directorate of Engineering and Services in a HQ USAF directed reorganization. The traditional role of the engineering function of operating, maintaining and upgrading Air Force real property and base facilities would remain the same basically, but that role would be molded, fashioned and enlarged in scope to include a host of initiatives that would bring into sharp focus the needs and livability of Air Force people.

Notable achievements of General Thompson are many and include his efforts to enhance combat readiness; establishment of the Air Force Commissary Service (AFCOMS) and the Air Force Engineering and Services Agency (AFESA); his guidance on the physical and ecological characteristics of all major air bases; his involvement in the development of the Air Installation Compatible Use Zone program; his personal impact on the quality of life for Air Force people worldwide; and his improvements in base level management through the Civil Engineering and Services Management Evaluation Team (CESMET). There was yet another benefit for which he should be remembered. Recognizing that a base civil engineer's leadership success is only as effective as the workforce he commands, General Thompson personally nurtured an ambitious plan to elevate the reputation of the professional officer and civilian force. By means of visits to installations worldwide, in small and large meetings and on one-to-one confrontations with his people, he instilled in them the importance of excellence in job performance, their significant role in providing "first class" service to the customers of Engineering and Services, and their equally important role in dealing responsively with their commanders. His work in this respect will stand as his legacy to civil engineers and services personnel for years to come.

General Thompson became a front runner in developing major initiatives to improve engineering and services' capabilities to support the mission during contingencies. Multiple coordinated programs were initiated to quantify worldwide engineering wartime manpower require-

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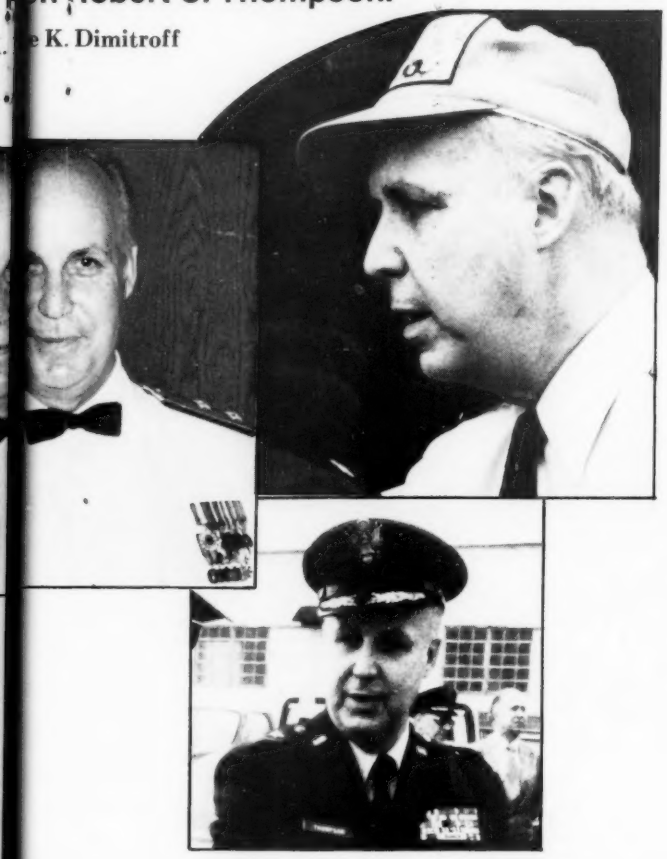
eriods in the history of the career hange and growth in image—con- the 12th Director of Engineering en Robert C. Thompson.

e K. Dimitroff



ments and to reposture engineering resources. He directed the implementation of programs to improve the capabilities to repair bomb damaged airfield pavements, increase air base survivability, provide new contingency runways at selected bases and develop new concepts for improved aircraft launch and recovery capability through expanded R&D efforts.

The concern to provide better service to customers is illustrated by his spearheading effort to completely reorganize the management of Air Force commissaries. He formed a task group that worked out the plan to establish AFCOMS as a separate operating agency whose sole function was the operation and management of 168 worldwide commissaries. The result has been a profound improvement in the efficiency and responsiveness of the commissary system.

When AFESA was activated, it was the result of General Thompson's concept that several engineering and services functions, previously performed under the command and administration of six different major commands and/or separate operating agencies, could be more effectively handled if placed in one organization and given centralized direction and control. Components of the agency included the Air Force Civil Engineering Center; Air Force Services Office; Air Force Regional Civil Engineer Offices; Air Force Mortuary Service and the newly formed AFCOMS.

During General Thompson's leadership, Air Force Civil Engineers and their commanders were being faced more and more with forced compatibility roles with the public. Air Force bases were becoming of particular interest to the local citizenry surrounding the installations. The Environmental Planning Division was established to insure that environmental considerations are introduced early in the planning and programming processes. General Thompson guided the reorientation of base master plans to provide an environmental narrative as baseline data on the physical and ecological characteristics of all major air bases. He also recognized the need for relevant information in the socio-economic area. As General Thompson foresaw, these initiatives provided Air Force decision makers with the valuable data necessary to adequately assess significant proposals and actions.

The General's involvement in the development of the Air Installations Compatible Use Zone program is indicative of his keen appreciation for coordinated planning and management of complex, national interest issues. Unrestricted land development had contributed to base closures or restriction of flying operations at a number of bases. The Air Force established a program to forestall encroachment in 1971; however, it became apparent that the arbitrary nature of the existing program and the very high land acquisition costs necessary to create buffer zones around existing air bases made the program unworkable. General Thompson directed an approach based on the concept of compatible land uses and cooperative planning between bases and the non-government-owned areas controlled by local communities. This program has achieved much greater land use compatibility, without costing the Air Force billions of dollars in acquisition costs for land surrounding Air Force bases.

There is no question that General Thompson's efforts to improve the quality of life for the Air Force family stand highest on his personal list

(Continued on page 22)

A TIME TO REFLECT

I have always been proud of our people. However, at the conclusion of my active Air Force career, I take especially great pride in the accomplishments of the men and women of Air Force Engineering and Services. In spite of limited resources, our air bases are better maintained, look better and are better than at any time in the history of the Air Force. Our fire departments have established fire loss records that are the envy of civilian communities throughout the world. Our food service operations and the dining halls have improved dramatically. Our commissaries are better today than we could have possibly hoped for just a few short years ago—and they continue to improve every day. Our engineering and construction people are providing some of the finest new facilities the Air Force has ever had. You, the men and women of Engineering and Services, have been responsible for all of this.

The responsibilities we bear in improving and maintaining the quality of life for Air Force people throughout the world are significant ones—far greater than any other single functional area in the Air Force. The things we do and the services we provide impact people in many, many aspects of their lives—where they work, live, shop and play. Your efforts impact medical facilities, where our people worship, where they park and drive, and often, where they go to school. In short, how well you do your job determines, in great measure, the quality of life in the Air Force. You have done—and are doing that job exceedingly well. We owe you much.

One more very important thought. Our responsibilities for improving quality of life are great. However important that is, we must never lose sight of the fact that being ready to carry out our wartime role is most important of all. It is well recognized that if airfield facilities aren't ready when needed, our planes won't fly. Therefore, the steps presently underway to restructure PRIME BEEF, reevaluate the food service wartime manpower requirements, improve training, and re-equip RED HORSE are of paramount importance. I know each of you is capable, willing and ready to assume this increasingly critical role.

Finally, my sincere and heartfelt thanks and appreciation to each of you for the truly exceptional job you have done. No one has been more fortunate than I, over these many years, for having had the privilege of knowing and associating with people such as you. There are none better.

Robert C. Thompson

ROBERT C. THOMPSON
Major General, US Air Force (Ret)

DIRECTORATE UNDERGOING SIGNIFICANT CHANGE

by George K. Dimitroff

Several significant changes are currently being implemented within the Directorate of Engineering and Services as the result of the Air Force announcement on 12 April 1978 to realign certain departmental headquarters and functions. Major developments, particularly the establishment of the Air Force Engineering and Services Center as a Separate Operating Agency (SOA), have occurred to date. Other actions are pending. The details concerning the results of these actions will be published in a later issue. Also, a final organizational structure of the new Center will be presented.

To give the Air Force Engineering and Services community an insight into the purposes of and the reasons for the headquarters departmental realignments, some background information is cited.

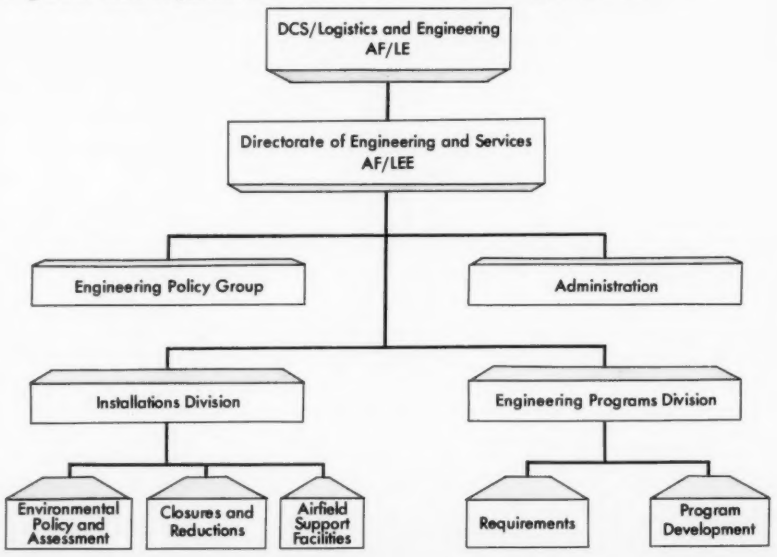
The underlying purpose for this realignment has been the long-standing Congressional desire to reduce the military presence in the National Capital Region (NCR). During 1977, working groups within the Air Staff prepared the plans that were necessary for reducing the number of Air Force manpower authorizations in the NCR. The intent of the total program was to improve the Air Force departmental managerial arrangements, reduce the Air Force presence and enhance the span and control of the Secretary of the Air Force and the Chief of Staff. Accordingly, the organizational structures in both the Office of the Secretary of the Air Force and the Air Staff would be simplified by grouping related functions.

When the Secretary of the Air Force approved these actions, the net effect within the Air Staff was a reduction in the number of directorates and an increase in the responsibility of directors.

Events which are important to note as they affect the Directorate of Engineering and Services are as follows:

- The Directorate was removed organizationally from the DCS/Programs and Resources (itself realigned and renamed the DCS/Programs and Analysis) and was placed into the new **DCS/Logistics and Engineering** (formerly the DCS/Systems and Logistics). Lt Gen John R. Kelly is the Deputy Chief of Staff, Logistics and Engineering.
- Establishment of the **Air Force Engineering and Services Center (AFESC)** as an SOA at Tyndall AFB, Florida. As a result of this action, the Air Force Engineering and Services Agency at Kelly AFB, Texas, was disestablished and its functions transferred to the new SOA.
- A total of 153 manpower authorizations, both military and civilian, are to be moved from the Directorate and reassigned to the new AFESC. When this requirement was levied, the criteria were to keep in Washington DC those functions that had the greatest interface with activities in the NCR. Under this criteria, the Programs Division and the Policy and Assessments Branch of the Environmental Planning Division were designated as key elements to remain on the Air Staff. The operations and maintenance budgeting functions and family housing programming activities were moved into the new Engineering Programs Division.
- Specific functions and eight manpower authorizations associated with base closures and reductions, the civil use of Air Force airfields and runways by non-Air Force aircraft and other joint-use agreements were transferred from the Directorate of Programs, DCS/Programs and Resources, to the Directorate of Engineering and Services.
- Specific functions and eight manpower authorizations associated with the determination of policy and priorities for flight operations which include airfield markings and lighting, flight disturbances, traffic control and landing systems, their equipment and facilities, and other related flying operations were transferred from the DCS/Operations, Plans and Readiness to the Directorate of Engineering and Services.

Figure 1: New Organization of Directorate of Engineering & Services.



The 16 manpower authorizations from the preceding were assigned to the new Installations Division within the Directorate. An organizational structuring of the Directorate at the Air Staff level as the result of these changes and transfers is shown in **Figure 1**. The new Directorate (LEE) will be configured as shown on 1 October 1979.

There are several other important realignments that are noted in relation to the establishment of the new AFESC. They are:

- The **Air Force Civil Engineering Center (AFCEC)**, presently located at Tyndall AFB, becomes collocated with the new Center. The AFCEC will continue to operate as before until 1 October 1979. In October 1979, those few Air Staff functions previously transferred will be combined with the AFESC staff. The original AFCEC functions including field assistance activities will remain at Tyndall AFB and be a separate element under AFESC.
- The **Air Force Regional Civil Engineer Offices** located in Dallas, San Francisco and Atlanta will remain in those areas and will become elements of the new Center.
- The **Air Force Services Office** in Philadelphia will become an element of the new Center.
- The **Air Force Commissary Service** at Kelly AFB, Texas, will remain at that installation and become an element of the new Center.
- The **Mortuary Services Office** at Bolling AFB DC, will officially become an element of the Air Force Manpower and Personnel Center, at the Headquarters level only, on 1 October 1978.

In association with these changes, it was announced on 1 July 1978 that Maj Gen William D. Gilbert became the 13th Director of Engineering and Services, DCS/Logistics and Engineering, and Brig Gen Clifton D. Wright is the Commander of the new Center. E&S

An Era Passes

(Continued from page 19)

of achievements. Because of his understanding of the human aspects involved, there has been a major redirection in facility design. No longer is it acceptable to merely provide functionally adequate and properly engineered facilities; rather, each facility design must meet the test of the human element—the character and purpose of the user now dominate decisions relating to design.

Another area that stands high in regard to his personal achievements was his development of a new management concept that has changed the way the Air Staff evaluates base level operations. Recognizing that more than half of the base's operation and maintenance budget is expended for base support functions rather than primary mission support, he pressed for more Air Staff visibility in the support areas. The result was establishment of the Civil Engineering and Services Management Evaluation Team (CESMET), which focuses on management results rather than procedural compliance. Since November 1974, CESMET has visited more than 85 major installations worldwide and the results have been better base level management, modification of Air Staff policies that were impediments to good management, and a new awareness of base level problems and operations.

A native of Tyrone, Pennsylvania, General Thompson's military career began when he enlisted in the Army Air Corps in 1942. Two years later, he graduated from Officers Candidate School and was commissioned a second lieutenant. He has a bachelor of science degree, a master of arts degree from the University of Maryland and has completed all course work for a doctorate.

A civil engineer since 1944, he has held a number of progressively responsible positions during his career. His early assignments have included those as Chief of Operations and Maintenance, Lowry AFB, Colorado, and Chief of the Management Division in the Directorate of Construction, Joint US Military Group, Spain, where he was engaged in the construction of Air Force and Navy bases throughout Spain.

In June 1960, he graduated from Air Command and Staff College and was assigned to HQ USAF as a facilities programming officer in the Office of the Deputy Chief of Staff, Research and Development. In July 1965, he transferred to the Air Force Western Test Range at Vandenberg AFB, California, as Chief of the Programs and Operations Division. He then was assigned to Tan Son Nhut Airfield, Vietnam, in 1966 as the Chief of the Programs Division, DCS/Civil Engineering. From 1968 to April 1970, he served as the DCS/Civil Engineering from 8th Air Force, Westover AFB, Massachusetts, and in the same capacity at 2nd Air Force, Barksdale AFB, Louisiana, from April 1970 to July 1971. In July 1971, he was assigned to HQ USAFE at Weisbaden AB, Germany, and later at Ramstein AB, and was named DCS/Engineering and Services.

General Thompson became the Deputy Director, Directorate of Civil Engineering, DCS/Programs and Resources, HQ USAF, in May 1974 and less than a year later, in April 1975, was named the 12th Director of Civil Engineering. In August 1975, he was redesignated Director of Engineering and Services as the result of the USAF directed organization. He retired officially on 1 July 1978, completing almost 35 years of active military service. E&S

Engineering Education: Is It Worth the Effort?

by Col Wallace E. Fluhr, PE

There are two groups of individuals who should periodically ask themselves the question "Is engineering education worth the effort?" First are the individuals involved in the teaching and administration of engineering programs. These individuals above all others, must be firmly convinced that they are making significant contributions to society as educators of future engineers. If they conclude that their efforts are a waste of time and resources, then they must pursue more useful purposes. Second are the individuals who have completed undergraduate engineering programs within the past 20 years at an institution of higher education. If all the effort which went into earning a bachelor of science degree in one of the engineering disciplines has not paid off in both financial and psychic rewards, then the students currently in engineering programs should be made aware of this fact.

On a scale of one to 10, undergraduate education in engineering would generally be given a "10" as being the most work and the most mentally demanding of all undergraduate programs. This fact is clearly the reason why attrition is high in engineering programs. Of all the bachelor degrees earned each year in this country, only approximately five percent of the degrees are in engineering fields. Many believe this ratio of engineers to all other degrees is about right, but others believe we are just beginning to see an increased demand for engineers.

An examination of the data made public by the College Placement Council (CPC) in August 1977 on the offers for jobs and the salaries proffered for the bachelor degree recipients for 1977 revealed some interesting information concerning all areas of our society. The CPC data refer to job offers made by employers for college graduates and are an indication of demand. More than 90 percent of the offers came from employers in the private sector, with the remaining 10 percent from governmental agencies and non-profit organizations.

The CPC data further revealed that, the five percent majoring in engineering in 1977 received 55 percent of the total offers. The 14 percent of the total graduates majoring in science and mathematics received six percent of the total offers. Business majors who consituted approximately 18 percent of the graduates, received 33 percent of the total offers. Approximately 62 percent of the graduates were in the remaining fields of humanities and social sciences and they received six percent of the total job offers.

Average starting salaries for engineering graduates at the bachelor's degree level were approximately $16,000 per year. In comparison, the average starting salary for science and mathematics majors was approximately $13,000 per year; for business and social science majors, approximately $12,000 per year; and, for humanities majors, approximately $10,000 per year. In this competitive environment for the limited number of engineering graduates each year, it is easy to see why there is a growing shortage of officers with engineering backgrounds in the Air Force. As a matter of fact, some of the engineering career fields in the Air Force are only 75 percent manned in the captain rank at this time.

Another important and interesting factor about engineering education that should be better understood and recognized, is the value of an engineering educational background to the manager. As our society as a whole, and the Air Force in particular, becomes more technologically oriented, there is an

increasing need for the "engineering manager" or the manager of technology. Industry has clearly moved in the direction of selecting top managers from those employees with a strong basic understanding of technology. Several universities have periodically studied the backgrounds of the top managers of large corporations. The results show that in the 100 largest corporations in this country today, more than 50 percent of the top 60 managers in each corporation have a bachelor's degree in a science or engineering discipline. In other words, these managers have started from a strong basic foundation of science and engineering knowledge and built strong management capabilities on top. Data from studies of the 100 largest corporations of 25 years earlier indicate less than 20 percent of the top 60 managers in each corporation had a bachelor's degree in a science or engineering discipline. The trend is clear. As our society becomes more technologically oriented, the individuals with a strong basic foundation of science and engineering knowledge are moving into the **management** jobs because these jobs are increasingly becoming **managers of technology** functions. This means increased demand and even wider job opportunities for the five percent of the college graduates who major in engineering.

More than 50 percent of the engineering graduates eventually earn a master's degree in business administration or management. Data regarding starting salaries of recent graduates of master's of business administration (MBA) programs reflect the importance of a basic background in science and engineering. On the average, new graduates of MBA programs received $1,500 more per year starting salary if the MBA was on top of an undergraduate degree in science or engineering than if the undergraduate degree was from a nontechnical area.

There is no question that one of the best possible preparations for the future top managers of our society (including the Air Force) is a strong basic knowledge of engineering as taught at the undergraduate level.

The undergraduate engineering program at the Air Force Academy is unique in that it combines a broad general education in social sciences, humanities, basic science, and engineering science with an opportunity for in-depth study of one of the engineering disciplines. The broad general education program is about equally balanced between social sciences and humanities on one hand and science and engineering on the other hand. Every cadet must complete 52½ semester hours of prescribed social sciences and humanities courses, including courses in behavioral science, economics, law, management, political science, English, foreign language, history and philosophy. Likewise, each cadet must complete 58½ semester hours of prescribed science and engineering courses, including courses in biological science, chemistry, mathematics, physics, aeronautics, computer science, electrical engineering, engineering mechanics and materials, astronautics and engineer-systems design.

The cadet who wishes to major in an accredited engineering discipline may choose from programs in aeronautical engineering, astronautical engineering, civil engineering, electrical engineering, engineering mechanics and engineering science. Thirty-three semester hours of engineering courses beyond the prescribed core curriculum are required to earn a major in any one of these engineering disciplines.

The 52½ semester hours of social science and humanities courses included in the engineering programs at the Academy are approximately twice the amount normally found in engineering programs at civilian universities. There are a number of reasons for this difference. First, the prescribed broad general education portion of the curriculum insures that every graduate of the Academy program has the educational flexibility to serve in any job required by the Air Force. Second, the unusually large amount of social sciences and humanities courses in the engineering programs provides excellent preparation for the Academy graduate with a major in engineering to serve as an "engineering manager," i.e., a manager of engineering functions, i.e., a manager of technology. Such a graduate has the strong basic foundation of engineering knowledge so essential to an "engineering manager" plus the basic foundation of social sciences and humanities upon which to build management skills.

The ultimate answer to the question "Engineering Education—Is It Worth the Effort?" is left to the reader. It is clear that engineering educators can take some pride in the fact that the products of their programs consistently enjoy the greatest demand and command the highest starting salaries of any collective group of graduates from four year undergraduate educational programs. It is very clear that graduates of engineering programs can take considerable pride in the fact that they completed one of the toughest and most demanding undergraduate programs in existence and that there is more and more evidence of the recognition that managers of technology of the future will require strong technical backgrounds.

So, stand tall and straight you Air Force blue-suit engineers; you are an irreplaceable resource in the defense of our country. You are uniquely prepared to lead in this age of technology.

E&S

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Civilian Education:

A Personal View . . .

A Need for a Personal Roadmap

by Herbert C. Bohannon, Jr

Kenneth Boulding in his book, **The Meaning of the 20th Century**, says that we are passing through the greatest transition in human history. At the heart of this transition are the accelerating forces of change and complexity. The great transition not only affects knowledge and the physical machinery of society, but social, political and economic institutions as well.

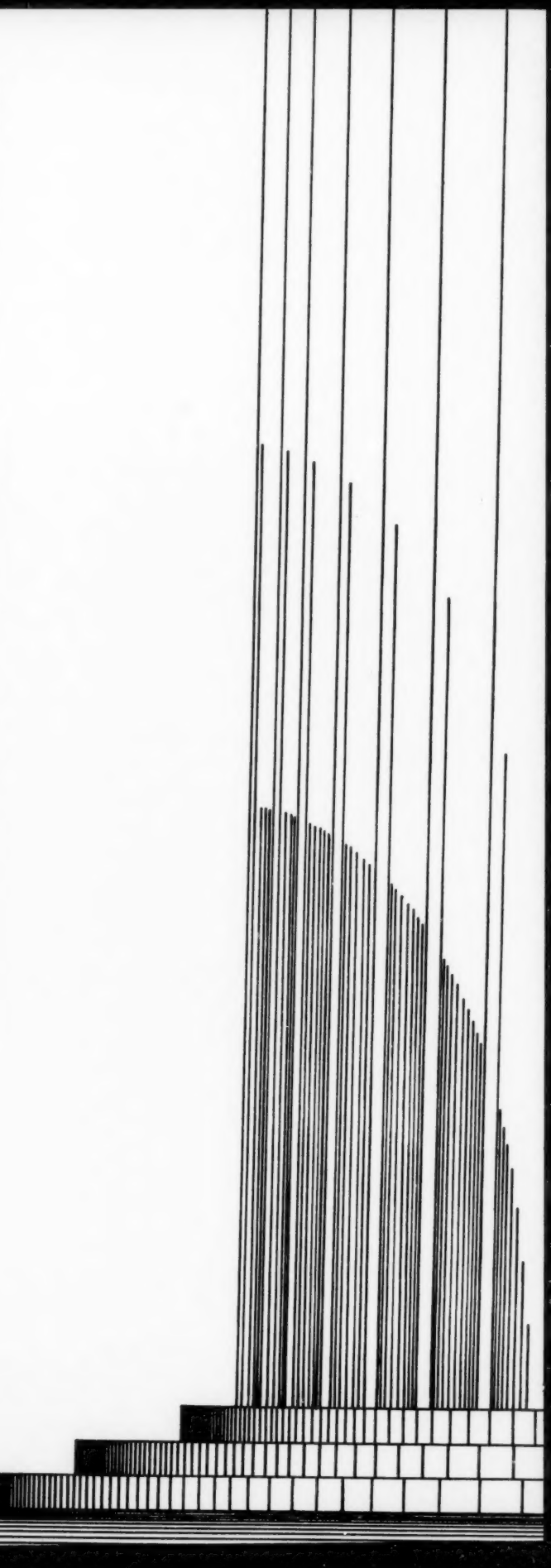
Few times have existed in our history when the interrelationships between these institutions and society have been more complex, more dynamic and more significant to the future of both institution and society. Now, questions are being raised about the fundamental functions society expects its institutions to perform. There have never been greater changes in the deeper social values, changes that will inevitably be reflected in institutional operations and business. Yet, these institutions have never before been a greater beneficial force in so many areas of society. Managers are thinking deeply about the impact of their organizations on their environment and the influence of the environment on their organizations.

The Air Force, and Air Force Civil Engineering as a vital substratum, are in the very mainstream of the transitional process . . .

Today's Air Force Civil Engineering manager must be able to deal not only with the usual trinity of personnel, funds and facilities, but with many other constituencies as well: regional interests, other Federal agencies, community spokesmen, ethnic or minority group leaders, trade union officials, questioning taxpayers, the media, environmentalists, state and Federal legislators, and emissaries from private industry such as the utilities.

. . . witness the flurry of activity in recent years concerning comprehensive and land-use planning, community planning, air compatibility planning, energy conservation, environmental planning and effective utilization of facilities.

Air Force Civil Engineering has recognized the



accelerated change in today's society and the need to restructure its approach to society. As a result, it is putting together a new base organization which is more responsive and sensitive to the various interests surrounding and within a base. The first portion of this is the formation of an environmental planning group with the traditional engineering and construction environment.

Other reorganization and tasks to come will undoubtedly reflect the same concern for establishing new kinds of institutional ties at all levels of society, wherein civil engineering managers must have a keen awareness and knowledge of the many facets and structures of modern life, many of which may be very far indeed from the confines of his or her particular and traditional discipline.

Many of our traditionally disciplined engineers are increasingly finding themselves in a strange environment. Growing national and Air Force concern for comprehensive and environmental planning has accelerated the current trend toward a multidisciplinary approach. The traditional civil, mechanical and electrical engineer is now beginning to see and experience association with "all types of strange bedfellows" including architects, agronomists, economists, sociologists, biologists, bioenvironmental engineers, and more recently, community planners, including urban and regional planners. Whether or not Air Force Civil Engineering maintains leadership in facility planning, design and construction together with a harmonious relationship with its environment depends in large part upon its willingness to broaden its outlook and its ability to work in a multidisciplinary setting. And there is the crux of the whole matter: "generalists" not "specialists" will likely lead the newly emerging Air Force Civil Engineering team.

But where will Civil Engineering find these "generalists?" . . .

Obviously, the Air Force will not simply replace all its technical engineering managers with imports from industry or directly from the universities. First, such "generalists" do not exist in great abundance in industry either. Industry is experiencing a similar situation, the need for development of specialized engineers into generalized engineering managers. Second, an excellent technical base already exists within civil engineering. Our engineering specialists and managers will serve as a base not only to join with the other professions to plan our future environment but to transcend the mastery of the building of single buildings and to move on to sharing in the design of whole environments.

The individual specialized engineer who has found himself or who will find himself in this situation will ask . . . "How can I become the 'generalized engineering manager' the Air Force desires?"

The answer, of course, lies in the individual's willingness to subject himself or herself to the required professional educational process. He or she must assimilate the required socio, economic, business and managerial thought processes to go along with his or her already existing, highly structured, engineering thought processes—the thought processes required to cope with accelerating social change.

The problem may surface that the engineer does not recognize the need and may not even ask the question. As Alvin Toffler says in **Future Shock**, we are experiencing change at such an accelerated pace that the engineer may indeed regress into a phenomenon he calls "future shock." Future shock is much more serious than today's cultural shock. It is the dizzying disorientation brought on by the premature arrival of the future. Decisions must be made quickly without due regard for subsequent consequences. This acceleration of change has been referred to by the biophysicist John R. Platt as analogous to the "shock front" at the leading edge of an airplane's wing as it breaks the sound barrier, before the air flow smoothes out again. In pure physics terms there is, after all, a limit to how fast and how much change is possible. Toffler says, "Put more simply, future shock is human response to overstimulation. Its victims often manifest erratic swings in interest and lifestyle, followed by an effort to 'crawl into their shells' through social, intellectual and emotional withdrawal. They feel continually 'bugged' or harassed, and want desperately to reduce the number of decisions they must make."

The need: to come to terms with change, not fight it, not surrender to it.

If one is to pass through this shock front, he first must recognize that he is living in a time of accelerated change, and second, he must prepare a personal roadmap for his future lifestyle and career. For many of us, this means a fundamental change in attitude. It means recognizing that today's radically different social context is not temporary but the shape of things to come. The engineer needs to calmly analyze this and to design new thought processes appropriate to it. The tools to do this, of course, lie in the educational process mentioned earlier.

However, not only are we in the midst of accelerating change and technological explosion, we are also witnessing a "knowledge explosion."

Many of us are unknowingly caught up in this explosion and swept along. Starting with World War II and gaining momentum with the Space Race and a tremendous flow of Federal reserve money, the "knowledge explosion" has governed the awareness of our generation. Today's engineer has seen course offerings such as space science, computer theory and technology, population research, econometrics, urban sociology, polymer science, biochemistry, engineering and construction management, linguistics, and many more

crop up alongside the traditional "bread and butter" engineering offerings. Many middle-aged Air Force engineers have had the experience of trying to work set theory in modern math with his youngster in grade school, or worse yet, with psychology, advanced chemistry, statistics or electronics at the high school level. Take it a step further, imagine the frustration some of our older engineers, who have not kept current, feel in communicating with some of the present graduates from institutions such as the Air Force Academy. The average high school graduate of today has had the same number of hours of formal schooling and reached the same academic level as the college sophomore of a generation ago.

Prominent educators in their writing hasten to point out that "America has become a knowledge-oriented society."

More and more, a college education has come to be considered essential by most, just as a generation ago the high school diploma was viewed as the minimum essential. Educational statistics indicate that "growing numbers of people now spend close to one third of their entire lives attending school." A rough calculation on my part, including all the formal education, training schools, seminars, and so forth, indicates that I have already spent approximately 20 years in school (more than half). The point to be made here is that the old cliche that an engineer must be periodically "retreaded" no longer holds true; rather, education has necessarily become a continuing, broad scale experience shaped largely by the student himself. The quoted rule of thumb used to be a "retread every 10 years to prevent obsolescence . . ." I would hate to speculate what that time span is now!

. . . your personal roadmap is a matter of setting priorities.

Your personal roadmap probably will comprise four major tasks: the setting of life and career priorities, the development of methods of accomplishing these priorities, and periodic evaluation and restructuring of the map to determine alternate routes and even to see if the destination remains the same.

I started without a fully developed roadmap . . .

As mentioned previously, I unknowingly was swept along with the education explosion that began in the early fifties. Only during the last year of high school did I establish a destination; I wanted to become an architect. The first slight change in route took place my first year in college. I selected an architectural engineering curriculum, a four instead of a five year architecture program. A second change took place upon graduation. I hired on as a civil field engineer with a private firm. Several more route changes took place—a stint with the Corps of Engineers as a construction engineer, then finally back toward my original destination—to Air Force Civil Engineering as an architect.

Thus, about three years out of college, a specialist, I found myself in a strange environment indeed, doing something that four university years had not prepared me for; I was actually required to **manage** construction programs, i.e., to deal with superior, subordinate and customer alike. Even though my technical skills seemed important, they were not the primary tools I had to draw upon. As yet, I had not recognized the need for a roadmap, but I did feel the need to perhaps find out more about this phenomenon I was performing—"managing." Therefore, over the next several years, working with the Kirtland AFB Civilian Career Training and Development Office, the Air Force funded about 16 rather unstructured, graduate hours of municipal engineering, construction management, traffic engineering, art, math reviews, and city planning. I was seeking broadened management experiences but I just could not break with those technical loves—architecture and engineering.

. . . but, the need for a more structured route became apparent.

It was not until I applied for and attended the Executive Engineering Course at the Civil Engineering School, Air Force Institute of Technology (AFIT), that I really got a better perspective on the Air Force management system as a whole and the need to personally plan a more organized approach to becoming an Air Force engineering manager. I realized, perhaps for the first time, that I really wanted to develop in and "marry together" three professional fields: engineering, architecture **and** management. I discovered a philosophy to follow: The modern administrator or manager, whether in the public or private sector, should be extremely knowledgeable in the broad field of management and be able to relate a variety of technical disciplines to his work responsibilities, as well as to the complex economic and social problems of the time.

Once I refined my roadmap, it became clearer and easier to select educational experiences from the many offered by the Air Force . . .

Because America **is** so knowledge oriented, training programs have proliferated in the military and in industry. I have discussed educational opportunities at various schools and seminars with a wide spectrum of people attending from government, industry and private business, and in my estimation, the opportunities offered by the Air Force and Air Force Civil Engineering are second to none. Again, because civil engineering managers are dealing with funds, facilities and **people**, the Air Force has no qualms about investing the training dollars necessary to keep its most important asset trained to the present "state-of-the-art."

Armed with my roadmap, I have yet to find one of my supervisors who would turn down a

reasonable request for educational assistance when I properly presented the need and the potential to the Air Force and the willingness to devote my own personal time to the accomplishment. A point should be made here: some supervisors interpret "job-related" much too strictly. In today's changing and accelerating Air Force environment, liberal interpretations must be made. If the employee can show you how a course dovetails into his roadmap, almost any educational experience that gets him back into an educational and thinking process eventually benefits his job performance. This is particularly true for the civilian member since the military member's career is already, to a large degree, an alternate work and education experience.

Some of the major educational experiences which I selected and the Air Force helped me to pursue include:

- The Executive Program In Industrial Management (University of New Mexico, School of Business and Administrative Science). A 160 hour, every other weekend (Friday and Saturday) full time, one year, management course designed to polish management techniques used daily.
- Some Civil Service sponsored courses held locally such as a series of Effective Presentation Workshops, effective writing, accelerated reading, Equal Employment Opportunity, and Labor-Management.
- Long Term Full Time Training. One full year at UNM leading to a master's degree in civil engineering (engineering and construction management), funded by the Air Force on a 3 for 1 time basis.
- Base Civil Engineering Staff Officer Course at AFIT.
- Environmental Quality and Natural Resources Seminar, Executive Seminar Center, Oak Ridge, Tennessee, as part of the Air Force sponsored Civilian Executive Development Program.

Education is not a guarantee for success but it is becoming increasingly more difficult to "work smarter not harder" without the proper thought tools.

The hardest thing I had to do after being away from the university for a while, particularly when I went back full time, was to retool my thought processes. Educators point out that "It remains difficult for the average working adult or retiree, even the most highly motivated, to break into the routine of the average college, with its prerequisites, credit-hour and residency requirements, and its bankers' hours of classroom instruction." The only advice I would venture here is to tailor your roadmap for short jaunts at first: extension courses at night, some after hours or duty hours graduate courses, seminar groups, short courses at AFIT (if you do not see something you need or like suggest it to the school).

Of course, I can safely state, it becomes harder the older you become, the more involved you are with your family, and the more you realize "there are brooks that bubble . . ." to keep involved in the education process and to take the initiative.

However, once you are accustomed to the continuity of the process, and you have been exposed to some new worlds of interest and your goals become firmer, then you can plan the longer duration trips. I believe you will be amazed at the impact the space age has had on the education process. There are many new techniques and gadgets to make it easier for you to learn and to shape that continuing, broad scale experience.

While I was at the university the second time, I met a young engineer who impressed me greatly with the roadmap he had seemingly structured for himself: He had just completed a bachelor's degree course in mechanical engineering, was completing a master's program in engineering and construction management, and was accepted in and beginning law school (which he later finished and is now practicing along with engineering). I could not help but think then, "What a powerful combination for today's environment!"

. . . now if I can just muster up enough fortitude to begin that next trip . . . that out-of-hours master's in business administration looks pretty good. E&S

HERBERT BOHANNON *is Chief, Engineering, Construction and Environmental Planning Branch, 1606th Air Base Wing, Kirtland AFB, New Mexico. He earned a bachelor's degree in architectural engineering and a master's degree in civil engineering from the University of New Mexico. He is a member of the Society of American Military Engineers and other professional fraternities.*

3700th Technical Training Group Course Offerings

(Continued from page 10)

AFS 566X1, ENVIRONMENTAL SUPPORT SPECIALIST/TECHNICIAN

3ABR56631—Environmental Support Specialist—PDS Code AWT (12 weeks)
3AZR56651-000—Water Plant Operator—PDS Code CXJ (2 weeks)
3AZR56651-001—Field Water Purification Plant Operation (600 GPH)—PDS Code EUF (1 week)
3AZR56651-002—Water Plants and Systems—PDS Code VWN (4 weeks)

Inquiries relative to course content should be addressed to: 3770th Technical Training Group/CCE, Sheppard AFB TX 76311. Inquiries concerning availability of training allocations, funding, and request for training should be addressed to STTC/TTGX, Sheppard AFB TX 76311.

Directorate of Engineering and Services

Current Emphasis

brief commentary on significant developments

FAMILY HOUSING OCCUPANCY--The substantial increase of 0.70% of gross occupancy to 98.87% Air Force wide (as of 31 March 1978) reflects improved management of the housing inventory. A further increase to the 99% goal would save over $300,000 a year in BAQ payments. Action should be taken at the installation level to increase low grade occupancy factors reflected on DD Form 1411. Permanent redesignation authority should be requested from HQ USAF/PREN for units consistently occupied by personnel other than for whom currently designated.

DESIGN AWARDS PROGRAM--Submissions for the 1978 Air Force Design Awards Program are due in AF/PREES by 29 September 1978. Projects of any size which were designed in-house by the Air Force or by an Architect/Engineer are eligible.

EXPENDITURES FOR DRAPES AND CARPETS--The per year dollar limits on purchases of drapes and carpets have been removed from TA106 and TA414. Each base is expected to use good judgment in selecting these items for Air Force facilities.

MAJOR CHANGES IN MINOR CONSTRUCTION (MC) PROJECTS--Revised 10 US Code 2674 and the DOD implementing directive which becomes effective 1 Oct 78 will significantly alter the programming and approval of minor construction projects. Changes are

. All minor construction work supporting an aircraft beddown or mission change must be approved as one project.

. Installation commanders must certify that MC projects over $100,000 comply with Public Law.

. Projects are programmed and approved according to the specific purpose of the work and must result in a complete and usable facility.

. All MC projects exceeding $10,000 must be reviewed over a 12 month period.

. New MC project approval authorities effective 1 October 1978 are

PROJECT COST	APPROVAL AUTHORITY
$100,000 or less	MAJCOM or below
$300,000 or less and over $100,000	HQ USAF
$400,000 or less and over $300,000	SAF
$500,000 or less and over $400,000	OSD

Air Force implementing instructions were developed during a joint HQ USAF/MAJCOM Workshop this spring. Revised Chapter 5 of AFR 86-1 has been drafted and will be sent to MAJCOMs during 1 October.

NEW MORTUARY AFFAIRS COURSE--This new slide/tape training course is designated ISD, N8-1416 thru 1420, Course 76-04. All base mortuary officers may obtain this course by submitting requests to HQ AACS/LGHL, Norton AFB CA 92409. Course content includes the subjects of Search and Recovery, Identification, Inspection of Remains, Inspection of Casket and Shipping Case, and Evaluating and Paying Next of Kin Claims (Primary and Secondary Expenses). This course will be expanded in the future to include other Mortuary Affairs subject areas.

NEW POLICY TO INCREASE OFFICER STABILITY--A new change, effective 1 May 1978, provides that an officer in the grade of Captain or above must have 3 years time-on-station before moving between CONUS locations and 2 years on-station between a CONUS to overseas move. Lieutenants may move from CONUS to overseas with only one year on-station.

Working Hard Is Not Always Enough

by the PALACE Blueprint Team

Have you ever known an officer who **worked hard,** but still couldn't compete well for positions of increased responsibility? Perhaps you felt the system to be unfair since the officer apparently wasn't being fully recognized for doing a good job. It's possible that this officer didn't develop and demonstrate his potential to maximum advantage. Perhaps you too are a victim of the **hard work can do it all** philosophy.

The job/officer match depicted in **Figure 1** tells it all. The "whole person" evaluation concept is the cornerstone of career management as practiced by your PALACE Blueprint team. "Performance" or "working hard" is the most important consideration in the job/officer match, but is not the **only** important indicator of potential to do well in the really big jobs.

Education is another important indicator of potential. In this context, education refers to the entire process of developing the character, knowledge and skill of our Engineering and Services professionals. To the Base Civil Engineer, the term "education" might immediately equate to attending the Air War College. To the Services Operations Officer, it might equate to an Air Force Institute of Technology/Education

Figure 1: The Job/Officer Match.

OFFICER MANAGEMENT JOB/OFFICER MATCH	
JOB CRITERIA	OFFICER QUALIFICATIONS
Level	Performance
Responsibilities	Experience
Experience	Education
Academic	Career/Plans and Needs
	Oversea/Remote
	Vulnerability

With Industry program with Sears, Roebuck and Company. Both of these development avenues are correctly identified as "education," and education in almost any form can help to develop and demonstrate the officer's potential.

Education for our professionals normally falls into three categories, advanced academic education, professional military education and formal technical training. The education needs of each of us may vary, but the need to fully exploit each education avenue does not.

Is your potential fully developed through the education process? Or can it be expanded through one or more of the three basic methods of becoming educated? Maybe we can help you to decide! Why not give us a call at **487-3451 (Engineering)** or **487-2768 (Services)**? Because working hard is not enough! C&S

A CORRECTION

New Dining Hall Design More Functional

An article entitled "The A La Carte System" in the May 1978 issue of the **Air Force Engineering & Services Quarterly** included a misleading floor plan that was referred to as a recommended configuration for a typical Air Force dining hall. The plan accurately portrays a common type of dining hall that exists throughout the Air Force which was designed using the old tri-service definitive.

A major problem with this design is the location of the dishwashing room adjacent to the dining area and the main entrance of the facility. This causes problems because of the difficulty in controlling noise, and also clean dishes must be carried across the dining room to be returned to the serving area.

A new dining facility design manual, presently at the printers, has a functional relationship diagram that places the dishwashing room adjacent to the kitchen and the serving area, and separates the dishwashing function from the dining room by a vestibule. In addition, sound absorbing screens or walls will be used to further reduce the noise. The design allows for any type of bussing operation desired.

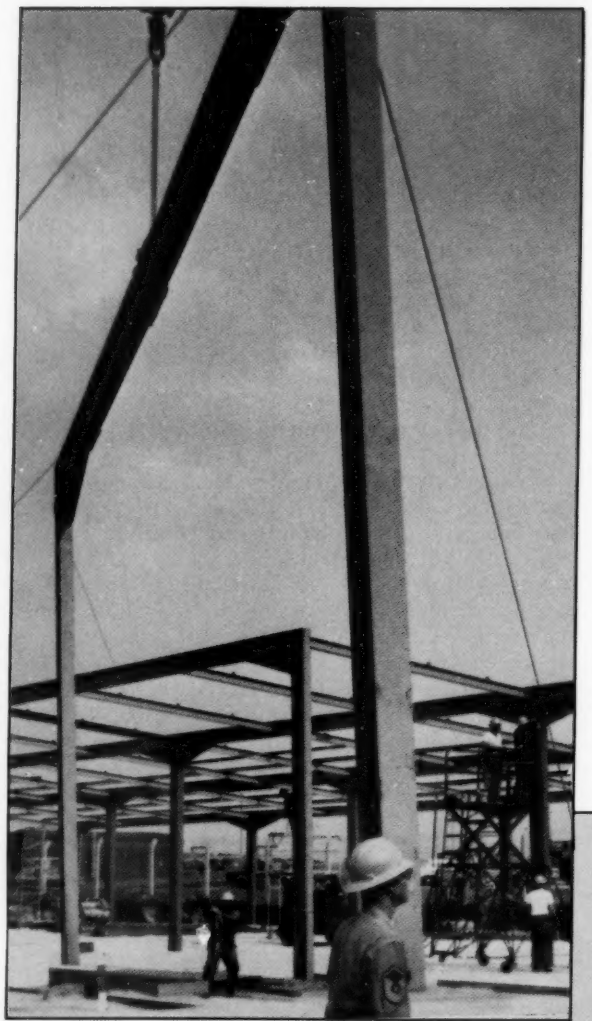
Without sacrificing the efficiency of the old dishwashing room location, the new design has the added advantage of sound control and direct access to the storage area for resupplying materials used in operating the dishwasher. Also, the people who work in the dishwashing room have easy access to the employee restrooms and locker rooms and are in a better location for supervision by the dining hall manager.

Any planned alteration of dining facilities or any new facilities should be based on the new guide manual to the extent possible. For additional information contact the Air Force Services Office, 2800 S. 20th St., Philadelphia, PA 19101. C&S

Manning and training are inseparable ingredients in the readiness recipe. The following are some helpful suggestions on how the BCE can better prepare himself when a Reserve Flight is assigned to his base.

The BCE's Role in Reserve Readiness

by Lt Col James P. Penn



"Retention and the combat readiness associated with the stable Reserve Force structure represent a major consideration in our contingency plans."

—Maj Gen Robert C. Thompson

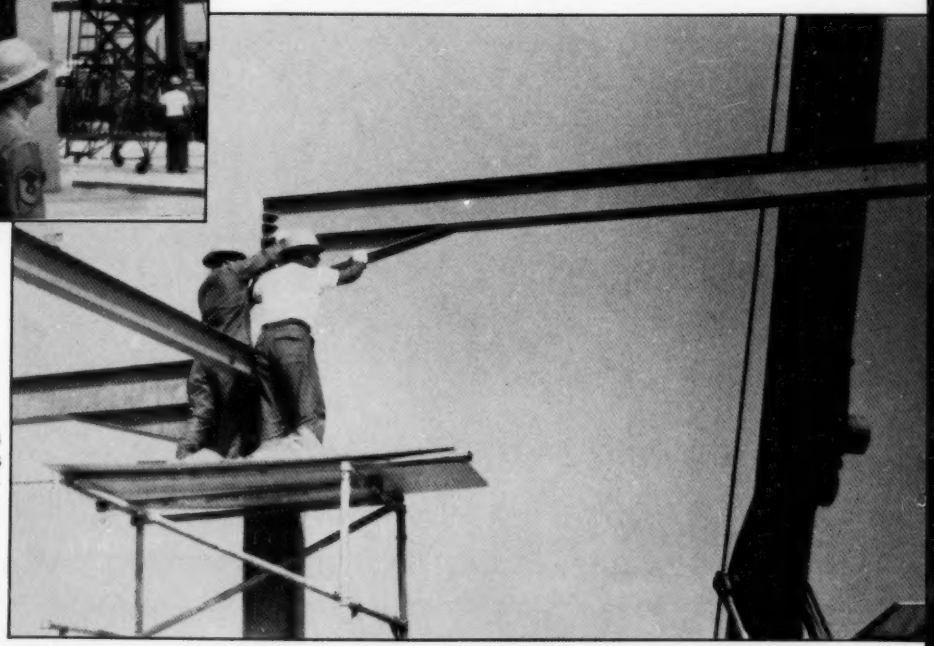
Readiness . . . Contingency Force Team . . . Rapid Runway Repair . . . Force Beddown are the new "buzzwords" of the redefined mission of Air Force Civil Engineering. What do they mean to the Base Civil Engineer (BCE)? How will Air Reserve Force (Air National Guard and Air Force Reserve) blue-suiters be affected? **How can the active duty BCE insure that he is helping prepare Reserve Forces to meet their wartime commitment as a combat-capable partner of the active force?**

The BCE's role in Reserve readiness is an important part of today's DOD incentives. He doesn't have to look far to become aware of the emphasis.

The message comes through loud and clear in the FY 79 DOD budget. Over $1 billion (of real growth) is proposed primarily for readiness related activity. High priority has been placed on those activities that will further increase combat capability, including an increased emphasis on training exercises and unit manning.

As a BCE, you may be working with Air Reserve Force (ARF) engineering training in these ways:

• A Civil Engineering Flight is assigned as a tenant on your base;



921st civil engineers from Kelly AFB make a new building out of the parts from five old ones at Sembach AB, Germany.

• A Flight performs its annual two week tour of active duty on your base; or

• Both of the above.

Manning and training are inseparable ingredients in the readiness recipe. Many commanders, concerned about active and reserve airmen leaving the service, have discovered in talking with these people that the primary and overriding reason for their dissatisfaction has been a "lack of meaningful training." Is the training really deficient, or is the real problem that the goals and objectives of the training are not understood and accepted? That's a question only the BCE can answer. But, he can do more than philosophize. He has the opportunity to insure that his most valuable asset, the skilled airman, remains on the balance sheet. Meaningful training is the route to retention, and total readiness demands high manning levels.

If a Civil Engineering Flight is assigned to your base, do you as the BCE

• Meet with the Flight managers before the training weekend to define their training needs?

• Select specific jobs from your IWP which will provide the required training?

• Assign technicians from your full time force, both civilian and military, to supervise the weekend training?

• Insure that the training opportunities include the "soft" engineering trades: the planners, work controllers, real estate and cost accounting functions?

• Work the Reserve Force fire fighters on 24 hour shifts in your station and insure they get their "hands on" the equipment?

• Let the Flight management structure control the weekend effort (with some smart "coaching")?

• At the end of the weekend, review the accomplishments and start the planning process for the months to follow?

Whether you have an ARF Flight on your base or not, the time may come when you host a team deployment. Here are some ground rules for maximizing training and productivity:

• **When the deployment assignment is received,** call the deploying team and find out how many people are coming, what skills they possess, and if there are any limiting factors. Commit your personnel to support critical areas where team capabilities are limited. But, keep the commitment to a minimum;

• **Task an outstanding person** as project coordinator (and appoint an alternate). Don't hesitate to use civilians. Well planned work, effective communications and good working relationships all add up to success;

• **Arrange pre-deployment conferences** where a small working group can develop common objectives and agree on support requirements (don't overlook vehicle support; Napoleon's army may have traveled on its stomach, but civil engineers need wheels);

• **When the team arrives,** conduct an in-briefing so you can welcome, explain, expound and inspire. Here's your chance to really get the project in motion. The briefing should also give the team an opportunity to meet the other base "movers:" the Base Commander, the BCE key staff, the Safety Officer and the Security Chief.

• **One final point:** If BCE's had a boldface checklist, this is what it would say: **Make sure that all material and equipment required is on hand BEFORE the team arrives.**

It's important to remember these rules because your chances of seeing an ARF team are increasing. The force reposturing is improving your odds.

ARF engineers are organized into Flights for peacetime management. These Flights formerly deployed as units, each to one active duty base per year (with a few spin-off deployments of fire fighters separate from their parent units). While the peacetime management structure will remain the same, annual deployments will probably be by team (or team combinations), which could nearly double the number of locations selected for the annual deployment schedule. Adding to the potential are engineers formerly assigned to AFRES Combat Support Groups, who are also acquiring wartime roles, team postures and deployment/employment training requirements.

Your role in Reserve Force readiness is insuring that your citizen-soldiers are fully trained to the standards of their AFSC and in the teamwork concepts implicit in the Readiness Reposturing. C&S

Contingency training and base needs were combined at Upper Heyford, United Kingdom as Reservists from the 935th set up over 1,000 feet of revetment.

COLONEL PENN *is Chief, Force Development Division, DCS/Engineering and Services, Headquarters Air Force Reserve, Robins AFB, Georgia. He received his bachelor's degree in aeronautical engineering from the University of Minnesota and a master's degree in urban and regional planning from Mankato State University, New Mexico.*

The Air Force ROTC program is changing to meet the expectations of today's youth oriented society and the ever increasing technological needs of the Air Force. Here are some interesting statistics on

Quality Engineers through the ROTC Program

by Lt Col James M. Warren

What images do the words Reserve Officers Training Corps (ROTC) conjure up for you? Skinheads? Drills? Barked Orders? Campus Unrest? At one time, these words might have been true—but no more! A full generation has passed since World War II, the campus unrest resulting from Vietnam is a memory, the mandatory draft has been replaced by an all volunteer service and a new vision of the role of the military in American society, different than five to 10 years ago, pervades the minds of students on our nation's college and university campuses. Over 1,000 officers and airmen on 143 campuses have the challenge of recruiting quality young people who have matured during a period in American history when the character of our population has changed with many traditional values and outlooks being challenged. The Air Force ROTC program has and is changing to meet the expectations of today's youth oriented society and the ever increasing technological needs of the Air Force. Fortunately, the Air Force is a young service which leads in human relations, satisfying job opportunities and concern for its people.

Changes in AFROTC

The AFROTC program has experienced major changes as a result of the implementation of the all volunteer services concept, the steady decrease in Air Force manpower ceilings and a procurement goal of about a 50/50 percentage mix of technical/nontechnical commissionees.

Less than 15 years ago, ROTC was mandatory at many colleges and universities and enrollments numbering more than 100,000 existed. Enrollment has dropped from over 100,000 in 1964 to 16,579 in 1976. A slight increase occurred in 1977. In prior years, AFROTC had a large base of freshmen and sophomore ROTC students to draw upon for entry into the advanced program but this is no longer true. Consequently, recruiting and counseling of highly qualified students for AFROTC is continually receiving more emphasis and is absorbing a greater share of every AFROTC instructor's time. Meanwhile, the Air Force's educational requirements for officers reflect increased emphasis on technical academic majors. In fact, the Air Force currently has a goal of a 50/50 percentage mix of technical/nontechnical for pilots and navigators and a 60/40 mix for missilemen. This has meant qualitative recruiting within a select group of highly qualified students who pursue engineering or technological academic majors. And this is the area in which AFROTC encounters its greatest competition: from industry, from the academies and other military services.

Since 1964, all services have offered ROTC scholarship incentives. Today over 5,000 AFROTC students are on scholarship, primarily in the engineering and science academic areas. Scholarships pay tuition, textbooks and lab fee costs and a $100 per month subsistence allowance. AFROTC predicts that an expanding scholarship program will be needed to meet future production and quality goals.

The turmoil of 10 years of steady cuts in Air Force manpower has had an adverse impact on AFROTC. A few years ago production of AFROTC officers, based on contracts made three to five years earlier, exceeded requirements of the Air Force, under cuts imposed by the administration and Congress. As few as three years ago this turbulence resulted in AFROTC graduates being delayed from coming on active duty for up to 18 months, entering active duty for 90 days and then serving in the inactive reserves, or accepting a change from a flying category to a support category. As a result of this unpleasant experience to AFROTC recruiting, it was agreed that AFROTC would limit its production to approximately 3,000 officers annually, with any excess requirements to be supplied by Officers Training School (OTS). Stability has returned with the adoption of this policy.

Another big change has been the addition of women to the AFROTC program. Women now comprise approximately 20 percent of our total enrollment and their number receiving scholarships has quadrupled within the last two years. These figures are significant when one considers the first women completed the program in 1971. Over 300 women graduates are expected in 1978.

It is important that one understands the role of

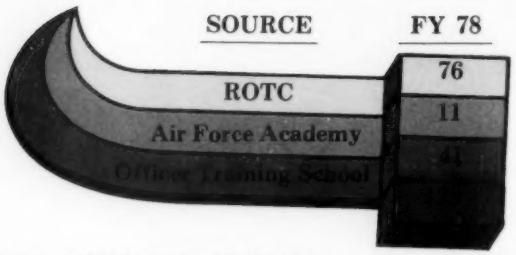


Figure 1: 55XX Accessions by Source.

ROTC and its relation to the 55XX career field in the context of the overall manning requirements and challenges faced on today's campuses—that being, primarily recruiting highly qualified engineering and science majors. Those same people that are being highly recruited and sought after by the other services are also being sought out by industry. For example, a recent Naval recruiting ad in the University of Pittsburgh student paper promised a salary in excess of $20,000 within two years for nuclear propulsion officers.

Current annual starting salaries for civil and mechanical engineers with bachelors' degrees and no experience are $15,408 and $16,668 respectively, which is three of four thousand more than that offered by the Air Force. The Air Force and other services may be required to offer incentives and/or bonus pay, as is currently done by the Navy for nuclear propulsion engineers, to assure both quality and quantity of engineers.

Importance of AFROTC to Civil Engineering

ROTC is the major source for Air Force officers and this is also true of the civil engineering career field. **Figure 1** presents the accessions for the civil engineering career field by source of commission.

The planned civil engineering accession requirements for FY 78 were pegged at over 200. These accessions were determined by the Military Personnel Center after a careful review of current Air Force manning within all career fields and projected Air Force requirements. The message is clear! **Our career field will have a shortfall of at least 72 officers, one-third of our annual accessions.**

AFROTC is a major source of Air Force Civil Engineers, **Figure 2.** The data indicate that AFROTC—as a source of commission—provides more than twice that of any other source. In fact, civil engineering is more dependent (61 percent) on AFROTC than the Air Force as a whole (42 percent).

How AFROTC Curriculum Relates to CEs

The AFROTC mission is to recruit, educate and commission officer candidates through a college campus program. Within the second aspect of this mission—education—AFROTC instructors are charged **first and foremost** with the responsibility to provide college level education which qualifies cadets for commissioning. Instruction is limited to

- **Strengthening each cadet's sense of personal integrity, honor and individual responsibility;**
- **Enhancing the cadet's knowledge by showing how the Air Force serves the national interest;**
- **Increasing the cadet's understanding of officer professionalism; and**
- **Developing the cadet's potential as a leader and manager.**

The academic curriculum of AFROTC is divided into two phases. The freshmen-sophomore course of two academic years includes a total of 60 hours of academic curriculum and 60 hours of Leadership Laboratory. The junior-senior portion of the curriculum includes a total of 90 hours of academics and 30 hours of Leadership Laboratory annually. The first two years are devoted to a review of the history of air power and the role of the Air Force in the contemporary world. Between the cadet's sophomore and junior year, he attends a four-week field training program at one of 13 Air Force bases. A student may elect to skip the first two years of the ROTC program by attending a six-week field training program provided he or she has two years of academic work remaining.

During the junior year, cadet studies are centered on management and leadership. Interestingly, few engineers are exposed to the theories and practices of management during their undergraduate years. True, most undergraduate engineering programs provide opportunities for several courses in the humanities/social science areas. These are introduced to enhance student awareness of the importance of social, economic, political and cultural problems. In short, this is the engineer's answer to the liberal arts practitioner's criticism of engineering curricula. If you really examine most engineering curricula, you find that these humanities/social science electives are added as course overloads. For example, a student graduating from the Pitt Engineering School is

Figure 2: Source of Commission by Grade (55XX/Total Air Force) Percentages.

Grade	AFROTC	OTS	Academy	Other
	60/40	3/4	18/10	19/46
	82/48	6/9	7/8	5/35
	57/38	27/31	12/8	4/23
	57/39	33/41	9/8	1/12
	56/47	31/23	13/15	0/15
	59/50	30/17	11/30	0/3
	61/42	28/29	11/11	2/18

required to have 134 semester hours whereas a student in the College of Arts and Sciences is required to have only 120 semester hours—14 less than the engineering student. Having just taught the AFROTC leadership and management course, the author is convinced this material will greatly assist students in making the transition from college to Air Force life and will have significant benefits to all Air Force engineers who otherwise would not have had training in management skills.

There is a direct relationship between the junior course of leadership and management and the duties of a civil engineer. For example, several topics which are discussed include Management by Objectives, Network Planning, Decision-Making, Organizing and Personnel Management. In addition, the individual motivational and behavioral processes, leadership communication and group dynamics are covered to provide a foundation for the development of the junior officers professional skills. One of the exciting and unique aspects of the AFROTC program is that the student is given an opportunity to integrate theory and practice through the Leadership Lab and Corps activities. Other collegiate programs do not permit the student to develop leadership skills in both the classroom and laboratory setting.

A recent addition to the AFROTC curriculum has been the Advanced Training Program. This program is separate and distinct from, but similar to, the Air Force Academy's "Third Lieutenant" program. This summer 18 55XX cadets will receive two weeks of specialized career orientation at eight Air Force bases. The cadet should have a greater appreciation of the duties, problems and responsibilities which he or she will encounter after graduation and commissioning. Host civil engineering officers will have an opportunity to instill enthusiasm and dedication and a look-see into future job opportunities for their cadets.

The senior year of aerospace studies examines the broad range of US Civil/Military relations and the environmental context in which defense policy is formulated and implemented. This two-semester course provides a foundation for future study in the area of Professional Military Education. Throughout the curriculum, cadets are encouraged and afforded opportunities to improve through practice their communicative skills, strong assets to any professional.

Quality Product: AFROTC CE

It is an accepted fact that graduates of engineering schools are better prepared to cope with a wider range of engineering problems than the graduates of a decade ago. Combined with the AFROTC experience of leadership, management and communicative skills, newly commissioned Air Force Civil Engineers are not only eager but prepared to accept the challenge. The scholarship program greatly assists in recruiting from the top five percent of high school seniors, those averaging more than 1200 points on their college boards (combined verbal and math scores on the Scholastic Aptitude Test). This significantly exceeds the 900 plus SAT point average scored by college bound high school graduates country-wide.

Obviously, these are the same students eagerly sought after by the top academic universities. Although many of our non-scholarship students do not have the academic credentials of the scholarship students, they are still above average because of their ability to pursue both a demanding engineering curriculum and ROTC, simultaneously. Based on the author's personal contact with over 80 junior and senior AFROTC students at the University of Pittsburgh this past year, he can attest to the high morale and optimistic view of these students toward their future as Air Force officers.

If any criticism can be leveled at our AFROTC civil engineering graduates, it is that their professional preparation as engineers is deficient in specific areas unique to Air Force Civil Engineering. Such areas include electrical power distribution, air conditioning and heating, corrosion control, energy conservation and pavement design and maintenance. However, if you investigate courses available in most engineering schools, you will find that these subjects are either treated lightly or not at all. If available, they are usually offered in engineering technology programs outside the traditional engineering curricula. Thus a strong case can be made, and has been for a number of years, for continuing education programs because undergraduate engineering curricula will continue to emphasize principles of math and physics first, at the exclusion of some professional engineering subjects.

When the next newly commissioned AFROTC civil engineer, highly charged and ready to roll, hits your base what kind of job opportunity will he be afforded? Will it be challenging? Demanding? If not, the Air Force may lose a highly motivated officer and a future leader of Air Force civil engineering. The product of the AFROTC program is better than ever—and that quality will be reflected in future leaders. E&S

COLONEL WARREN *is Commander, Air Force ROTC Detachment 730, University of Pittsburgh, Pennsylvania. He earned a bachelor's degree in mechanical engineering from Texas A&M University, a master's degree in engineering at Arizona State University and a doctorate in engineering from Arizona State University.*

Got A Problem???

Got a problem and no time or money to solve it? The Air Force Institute of Technology's School of Systems and Logistics at Wright-Patterson AFB, Ohio, may be able to help.

The School's Graduate Education Division conducts both student and faculty research into a **variety of complex problems** facing managers in many different Air Force organizations. Student research is accomplished under the thesis requirement of the various master of science degree programs offered by the School. The thesis is the primary vehicle used in the graduate programs to integrate and reinforce concepts presented in the classroom. It examines those problems of practical significance and contemporary interest to managers of Air Force logistics and civil engineering activities.

Previously, civil engineering students who were enrolled in the Facilities Management Program investigated problems in such areas as environmental control, installation closures, solid waste and resource recovery, management information systems, workforce productivity, energy consumption, civil engineering requirements, family housing management, organizational communication and design scheduling. Of course, this is only a partial list of typical research topics; however, it does suggest the wide range of problems being studied by students. While the primary purpose of the thesis is an educational one, with emphasis on scholarship and rigorous investigation, it is not simply an exercise in "intellectual gymnastics" of interest only to the "ivory tower" types.

Students are encouraged to study problems of **pragmatic interest to civil engineering managers.** Research topics are identified by the students as a result of their previous experience, and by faculty advisors or representatives of various civil engineering agencies. During their research, students bring several years of on-the-job experience to bear on the problem along with a developing research expertise and a variety of management science and functional skills. The faculty provides guidance and criticism, and the individual or agency requesting or sponsoring the research serves as a source of data, as well as the students' interface with the "real world" problem being investigated.

In addition to the student research program, Graduate Education Division faculty members also conduct research and consulting studies on problems identified by various Air Force organizations. Faculty members have expertise in such areas as engineering, manpower, procurement, economics, accounting, organization design, organizational behavior and development, systems analysis, and various other management science applications. Faculty research and consulting projects in many of these areas are currently under way in several different Air Force organizations.

If you have a problem that you believe may be a potential topic for student thesis or faculty research, simply write to the **Facilities Management Coordinator, AFIT/LSGM, Wright-Patterson AFB, Ohio 45433, or call AUTOVON 785-5023/5096.** To get your idea into the system, we need: (1) a general description of the problem; (2) a one sentence problem statement; (3) any references, including personnel, studies or publications that may be useful to the researchers; and (4) your name, organization and phone number.

We need your ideas and you may be able to use our solutions! E&S

Projected End of Summer Assignments

The following list contains the names of colonels (and colonel selectees) and their current or projected positions (as of the end of the summer 1978). Because of early publisher deadlines, this list is current as of 22 June 1978. Some changes may have occurred since the list was submitted for publication.

NAME	POSITION
A	
Ahearn, Joseph A.	ICAF
Alkire, Melvin G.	ATC/DE
Allison, Thayer W.	Clark/BCE
Amerio, Umberto M.	PACAF/DEM
Atchley, Jimmy O.	Grand Forks/BCE
B	
Beckwith, Wayne K.	ATC/DE-2
Bohlen, George A.	Peterson/BCE
Bond, Gerald E.	FE Warren/BCE
Borowski, Eugene C.	March/BCE
Brennecke, Harold J.	Kadena/BCE
*Bruenner, William	USAFE/DEH
Bryant, Warren A.	Norton/BCE
C	
**Cafiso, Matthew M.	USAF/PREM
Callahan, Joseph T.	Kirtland/BCE
Carey, Robert L.	McClellan/BCE
Carr, Benny M.	SAC/DEE
Catlin, John E., Jr	USAFE/DE
Clark, Zack C.	Ramstein/BCE
Clements, Douglas M.	USAF/LEEC
Cocke, William F.	AFCOMS/ER
Colvin, Thomas E.	554 RH/Osan
Conover, Charles B.	Bergstrom/BCE
Conry, James M.	USAFE/DEP/NATO
Cornell, David M.	Barksdale/BCE
Correll, Charles A.	MAC/DE-2
Cothran, Thurman D.	ADCOM/DEM
Cunningham, John T.,	AFSC/DE-2
Cusick, Paul B.	Loring/BCE
D	
Daniels, P. J.	Ellsworth/BCE
Deluca, Jerry J.	AFRCE/WR
Doran, Donald A.	Beale/BCE
E	
Ellis, George E.	AFCEC/CC
F	
Ferree, David F.	Bolling/BCE
*Fike, Tommy F.	TAC/DEH
Flowers, Ansel T.	823rd RH/Hurlburt
Fluhr, Wallace E.	USAFA/Faculty
Francis, George F.	Eglin/BCE
*Fried, Clarence D.	USAF/LEEH
Fullmer, Wayne M.	McChord/BCE
G	
**Gagnon, Raymond C.	AF/NGB/DE
Garren, Ronald R.	AFSC/DEE
Geer, Richard P.	5AF/DE
Gennaci, Ignatius J.	AF/SOUTH
Gifford, Robert N.	ADCOM/DE-2
Gogal, Robert M.	USAF/LEET
Goodwin, Roy M.	Naval WC
Gormley, Vincent	SAC/DEH
Gracey, Robert H., Jr	Maxwell/BCE
H	
Halac, Harry E.	Langley/BCE
Hale, Jerry W.	Holloman/BCE
Hall, John A.	AFCOMS/WR
Hampton, John A.	Elmendorf/BCE
Harding, Robert C.	Altus/BCE
Harlan, Maurice R.	USAFE/DEP
Hartmann, Arthur J.	ROK/US-CFC/DE-2
Harty, John R.	MAC/DEM
Hawkins, James R.	AF/LEEE
Hedge, Thomas L.	Hickam/BCE
Hicks, James N.	WPAFB/BCE
Hinz, Richard H.	USAF/Leep
Hobbs, Terrence E.	SAF/MII
Hodge, Ralph	Andrews/BCE
Hoelzer, Ronald N.	Shaw/BCE
Hurst, Gerald B.	USAFSS/DEP
J	
Jarvis, Richard J.	Tinker/BCE
Jensen, Norman K.	ADCOM/DEP
**Jewhurst, John H.,	USAF/LEEP
K	
Kautz, James G.	Nellis/BCE
Kent, Richard B.	SAC/DEM
Kinder, Morris B.	USAFA/DE
Klingensmith, Robert	PACAF/DE-2
Knutson, Duane E.	Malmstrom/BCE
Korzep, David A.	Hill/BCE
Krueger, Earl L.	Vandenberg/BCE
L	
Larimore, William H.	MAC/DEH
Lemons, Roy D.	USAFSS/DE
Lustig, Sheldon J.	SAC/DE-2
M	
MacKenzie, James S.	USAFE/DEM
Maines, Leland	AFCOMS
Martin, William C.	SAMSO/DE
McFarlane, Raymond	Sheppard/BCE
McGovern, Larry E.	Eielson/BCE
Morton, Alan W.	AFSC/DEP
Munsie, Lawrence,	COMUS/Japan
Murray, Edmond F.	Osan/BCE
Mussetto, Elo	AFRCE/CR
Myers, George F.	TAC/DEP
P	
Paul, Herbert D.	ATC/DEP
Pearman, John D.	Lackland/BCE
Perritano, Frank R.	ATC/DER
*Perry, John	USAF/LEEHS
Plack, Richard P.	1185 CE GP/CC
Poad, William J.	TAC/DE-2
Poirier, John T.	ADCOM/DEE
Pope, Dallas H.	Yokota/BCE
Potter, Frederick R.	McGuire/BCE
Price, John C.	AFISC/EN
Prince, Neil E.	AWC
R	
Rains, William E.	TAC/DE
Reaves, Donald R.	Kelly/BCE
Reding, John J.	Rhein Main/BCE
Reining, Robert R.	PACAF/DE
Rice, Tommy E.	Lowry/BCE
Reynolds, Pleasant G., Jr	Robins/BCE
Robb, William G.	USAFE/DER
Roesener, Arlie K.	8th AF/DE
Roth, Charles A.	Edwards/BCE
Rubenstein, Morris	ADCOM/DE
Rutland, George L..	Chanute/BCE
S	
Sachs, Sumner S.	ESD/DE
Salem, Leroy J.	AFCOMS/CR
Scheideman, Elton	Minot/BCE
Schultz, Sterling E.	AFCEC/DEV
Scrafford, Richard E.	Dover/BCE
Sexton, John N.	PACAF/DEP
Shaw, William M., Jr	AFLC/DE-2
Sheehan, Leo F., Jr	SAC/DEP
Sims, William R.	ICAF
Smiley, K. S. Jr	Phase 4/PMO/DE
Smith, Thomas W.	Fairchild/BCE
Staton, William D.	Charleston/BCE
Stebick, James A.	IG/Gnd Safety
Stowell, Dibrell C.	D-M/BCE
Strait, Ernest D.	USAFE/DE-2
Strom, Oren G.	AFIT/DE, Dean
T	
Tate, George R.	AFLC/DEM
Taylor, Daniel D.	15th AF/DE
Tefft, Howard E.	USAF/LEEM
Thomas, George J.,	MAC/DEP
Thomas, John P.	SARPMA/CC
Tissaw, George H.	USAF/LEER
**Troutman, Ray K.	AFRES/DE
Tuttle, George G.	Andersen/BCE
V	
Vale, Lewis G.	AFSO
W	
Waldron, David L.	AAC/DE
Watkins, Church,	NWC
*Watson, Marion	AFCOMS/Europe
Willett, James G.	SAC/DEV
Woods, Donald R.	AFCS/DE
Y	
Yamada, Hisao	USAF/LEEV
Yancey, Kenneth E.	OSD/I&L
*Yee, Edmund C.	PACAF/DEH
Yow, Bobby G.	Carswell/BCE
RETIREMENTS	
Bolton, Howard F.	Jackson, Donal P.
Busick, Charles P.	Key, Sydney E.
Cooper, Kenneth M.	Liddicoet, William B.
Dixon, Robert E.	Lindberg, Charles
Dominguez, Luis F.	Macoubray, James G.,
Dupree, Forist G.	Magazu, Harry H.
Edwards, David J.	Martino, Salvatore F.
Foster, Herbert R.	Porter, Leroy C., Jr
Frias, Reynaldo	Snider, Henry G.
Hollingsworth, Joe	Weaver, Thomas G.
Iten, Robert M.	

*Services
**Reserve or Guard

Malmstrom AFB, Keesler AFB Win Top Hennessy Trophys

Malmstrom AFB, Montana and Keesler AFB, Mississippi, shared first place honors in the 22nd annual worldwide Hennessy Trophy competition held in Chicago on 20 May.

Malmstrom AFB was awarded first place in the single unit category and Keesler AFB was the top winner for multiple units.

Runners-up in the single unit and multiple unit competition were Sembach AB, Germany and Eielson AFB, Alaska, respectively.

The Hennessy Trophy competition, sponsored jointly by the Air Force and the National Restaurant Association in conjunction with the International Food Service Executives Association and the National Industrial Cafeteria Managers Association, marked its 22nd year of involvement with a worldwide effort aimed toward excellence in Air Force food service.

The Hennessy Trophy award honors the late John L. Hennessy, a hotel and restaurant executive appointed by President Franklin D. Roosevelt to assist the military with food service problems during World War II.

Eight Air Force military and civilian personnel were also named outstanding in food service for their commands and were presented Hennessy award certificates at the National Restaurant Association meeting. They were: SSgt Rheynard Brown (AFSC); MSgt Roland L. Tremblay (ADCOM); Ms Robbie Foster (AFLC); James O'Leary (MAC); A1C Brian T. Pesci, (PACAF); Emerson Williams (TAC); Leonard Dacus (AU) and Clarence Spaulding (USAFSS).

Trans-Alaska Pipeline Named Top Engineering Achievement of 1978

The Trans-Alaska Pipeline, possibly the most difficult engineering and construction project ever undertaken by mankind, has been selected as the Outstanding Civil Engineering Achievement of 1978. The announcement was made recently by the American Society of Civil Engineers.

The 800 mile Trans-Alaska Pipeline has one purpose: to make the 9.6 billion barrel oil reserves at Prudhoe Bay available to US industry and consumers. About 1.2 million barrels of oil a day are being transported through the line from Prudhoe Bay to Valdez for shipment by tanker to West Coast ports. At capacity, the total could reach 2 million barrels a day.

Receiving awards of merit in the Outstanding Civil Engineering Competition were Detroit's Renaissance Center, the nation's largest privately financed effort at rejuvenating a downtown area; and Denver's Floating Stadium, the 21,000 seat movable section of Mile High Stadium, which converts the structure into a multi-purpose facility.

AFA Presents Kamenicky Award for 1978 to 2nd Lt J. F. Betz

2nd Lt John F. Betz was named the 1978 winner of the Kamenicky Award as the Outstanding Cadet in Civil Engineering at the Air Force Academy. Lieutenant Betz also received recognition as the Outstanding Graduate in Engineering Mechanics. He was on the Superintendent's List for excellence in both academics and military training for six semesters.

Lieutenant Betz will pursue a master's degree in civil engineering at Texas A&M University under a Fanny Hertz Fellowship. He is then scheduled to enter undergraduate pilot training.

The Kamenicky Award is sponsored by the civil engineering officers of the Air Force. It memorializes a civil engineering graduate from the Air Force Academy who died in 1971 in Southeast Asia when his aircraft crashed after being hit by hostile ground fire.

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